eyeheight

# LE-3G

3G Legaliser module with composite/RGB gamut correction and 4 independent channels of audio loudness/peak correction (Karma audio)

## user manual

# User Manual Versions

| Versions | Changes | Date | S/W Ver |
|---|---|---|---|
| 1.0 | First Version | 16/06/08 | 1.00 |
| 1.1 | Comp/RGB mode added | 18/11/08 | 1.03 |
| 1.2 | User memories and user presets and user preset settings updated. | 04/12/08 | 1.04 |
| 1.3 | Added new section explaining how presets are disabled when the unit has just been powered up without video and menu locking/unlocking | 25/01/10 | 1.15 |
| 1.4 | Added blanking, settings restored when video standard changed, tamper locking of user menus | 18/02/10 | 2.0 |
| 1.5 | Change to new single piece 3G compatible hardware | 02/06/10 | 2.0 |
| 1.6 | Corrected EBU-R103 references | 15/09/10 | 2.0 |
| 1.7 | Added KARMAudioRT option | 13/01/11 | 2.1 |
| 1.8 | Changes for revised software | 01/08/12 | 4.0 |
| 1.9 | 3G version | 01/08/12 | 4.0 |
| 2.0 | 4 channels of Karma audio added | 06/09/13 | 8.2 |



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# System Overview

This manual describes the function of the **LE-3G**. The **LE-3G** is a geNETics processing card which fits into a single slot of the eyeheight etherbox (FB-9E). This manual must be used in conjunction with the etherbox manual which contains much of the generic information common to all eyeheight **geNETics** products.

## 1.1 The LE-3G Product

The **LE-3G** is a 3G-HD-SD full-featured legaliser system with audio levelling using the **geNETics** platform. The main features of the **LE-3G** are as follows:

- Available in Standard Definition, Multi-rate and 3G.

- Provides Legalisation of the SD SDI input (Standard Definition version) SD/HD/3G SDI Input signal with full 10 bit processing throughout (MultiDef version), or 3G level A, 1080 50/60p.
- Composite, YCC (Component) and RGB colour spaces.
- Two Independent SD/HD/3G SDI outputs, each changeable between "Legalised", “Raw” and “Indicate” out.
- Adjustable Clipping Levels.
- Adjustable soft clipping knee levels.
- Highly effective overshoot and undershoot suppression on the luminance signal.
- Integral luma and chroma gain, black level adjustment & hue rotation.
- EBU-R103 standard legalisation settings.
- 7.5 IRE or 0 IRE Pedestal.
- 4 independent channels of KarmAudio loudness levelling with True Peak adjustment and 1770 short term and momentary real time levelling algorithms. Each channels can process up to 6 embedded audio channels (5.1)
- 6 User Memories.
- Log output with Time code and PC viewer programme.
- 2 off On-board GPI’s for memory recall.
- Compatible with etherbox GPI/Tallies.
- FULLY software and firmware updatable using Flash technology.
- On-Board simple text based RS232 automation protocol. Compatible with eyeheight **geNETics** automation protocol.
- Mechanical relay bypass available.



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**Figure 1: LE-3GU Processing card.**

**Figure 2: LE-3GS and LE-3GM Processing card.**

## 1.2 Associated Equipment for the LE-3G

The **LE-3G** processing card requires the following in order to set up and operate the unit.

1. An etherbox chassis (FB-9E). Up to six **LE-3G** units and be installed in one chassis.
2. A Flexipanel control surface such as an FP-9 or an FP-10.


**Figure 3: Front view of etherbox (FB-9E) fitted with FF-9 blank panel**



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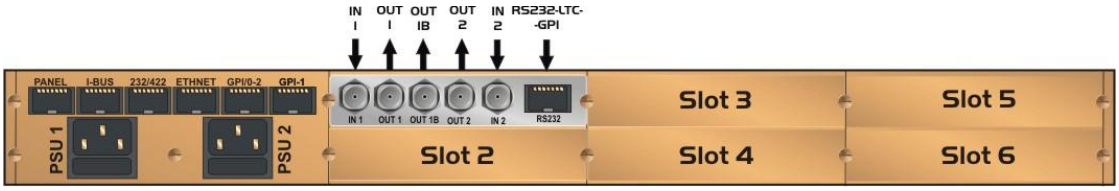


**Figure 4: Rear view of etherbox with a single LE-3G installed.**

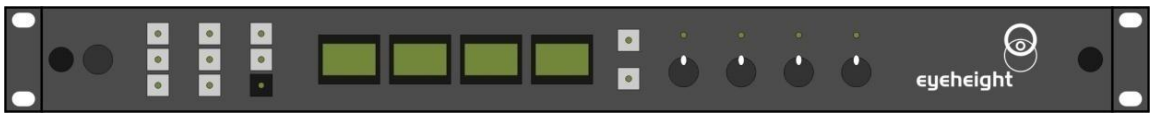


**Figure 5: FP-9 Flexipanel can be fitted on the FB-9E or remotely using and RR-9 kit.**



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# 2 Installation

This unit requires HD SDI or SD SDI or 3G digital video connections to the BNC connectors. Optionally RS232, GPI's and LTC may also be connected normally using CAT5e or better cable. The user should refer to the etherbox user manual for installation of the **LE-3G** into a chassis and connection of flexipanels. This will also describe the process of acquiring a processing card (in this case the **LE-3G**) by the Flexipanel which is necessary to access the menu structure within the **LE-3G**.

## 2.1 Connections on the LE-3G product

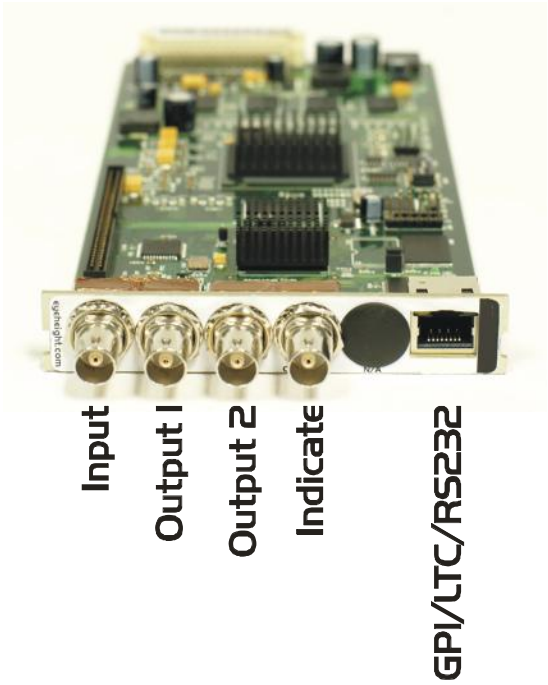


**Figure 6: LE-3GS or LE-3GM connections**

The main video connections to the **LE-3GS or LE-3GM** are shown above. Outputs 1 and 2 are the legaliser outputs. The Indicate output is configurable independently as either Legal, Raw or Indicate outputs. The RS232/GPI/LTC connection pin-outs are shown in the technical appendix at the end of this manual. The RS232 connection can be connected to the COM port of a PC with the eyeheight "Error Logging Application" for QA (Quality Assessment) recording purposes. The LTC connection will allow for accurate time code stamping for the QA.

The RS232 can alternatively be used to recall user memories and presets with a simple text based RS232 protocol.

Three GPI's can be used to recall user memories 1 and 2 respectively.



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# 3 Operation

All GeNETics products are controlled using a generic menu system. This generic menu system is operated from a generic panel (Flexipanel FP-9 or FP-10). An FP-9 is shown below (An FP-10 has the same controls in a different layout style). For information about acquiring processor cards for control on a Flexipanel see the etherbox manual section 4.

## 3.1 General Flexipanel controls

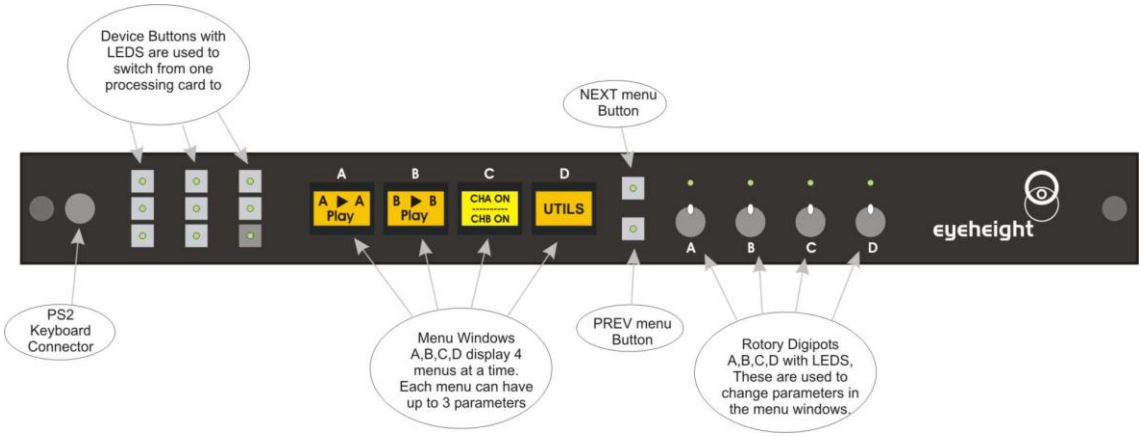


**Figure 7: Flexipanel (FP-9) controls.**

### 3.1.1 Device Buttons

There are 8 grey device buttons. These switch between the currently selected processing cards installed in the etherbox. It is also possible to select cards in another chassis if the I-Bus is connected to the other chassis.

### 3.1.2 Menu Navigation

There are two ways to navigate from menu to menu.

1. Using the NEXT and PREV buttons. These are for “Flat” menu structures. The NEXT and PREV LEDS will flash while further menus are available.
2. Using a GOTO ANOTHER MENU LCD button (as below coloured orange). This is more common and will take you straight to a relevant set of menus. Examples are the Play and UTILS menu’s shown on Figure 8.


**Figure 8: Types of menus showing their characteristic colours**



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### 3.1.3 Parameter adjustment of a green menu

A green menu is one in which there is only one adjustable parameter. There are two ways to adjust the parameter in a green menu.

1. Press the green LCD button. This will increment the value in that window. This is most frequently done when the menu parameter is Textural for example switching a parameter between ON and OFF. In this case a button press is most natural.
2. Use the Rotary digipot (A, B, C or D) to adjust the parameter in the respective LCD window (A, B, C or D). The direction and speed of rotation enable numeric values to be set easily.

### 3.1.4 Parameter adjustment of a red menu

A red menu is one in which there is two or three adjustable parameters. In this case it is necessary to first select the menu by pressing the red button. When the red button is pressed it will turn green and either two or three of the rotary digipot LEDS will flash indicating that the respective rotary digipot will operate the respective parameter.

### 3.1.5 Information display

A Yellow menu (Which on most panels does look a light orange!) is one in which only information is displayed. An example of this is the software version display.

## 3.2 Setting up the LE-3G

A Block diagram of the video legaliser is shown in Figure 9. Each section is discussed below.

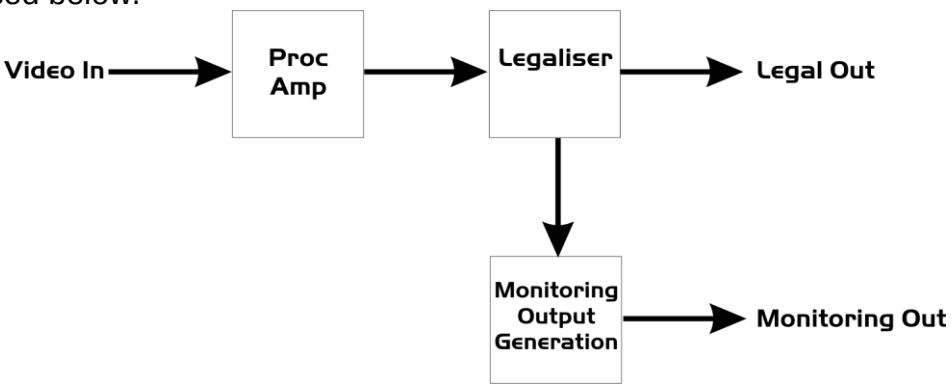


**Figure 9: Basic Legaliser Structure**

### 3.2.1 Legaliser

The legaliser operates in one of three modes; RGB, YCC (component) or Composite. The mode is selected via the top level mode menu. Each mode is discussed below. In all modes the legaliser is transparent to pixels within the legal range.



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### 3.2.2 Selecting the legalisation type

This is a view of the top-level display of the LE-3G:

**Menus 00-03: Top Level Menus**


To select the audio levelling required Press menu A to cycle through the available options. These are:

- Audio Bypass – No audio processing is done. The embedded audio is passed through untouched and not regenerated.
- Audio Lim Active – This takes the settings that the user sets and leaves from the KarmAudio setup menus whilst in this mode. See link below [KARMAudioRT Loudness and true-peak control]

To select the type of legalisation required, press menu B to cycle through the available options. These are:

- Video Legal off – no processing of the input video will be performed by the **LE-3G**.
- Video Legal RGB – the picture will be RGB legalised according to the RGB clip and knee settings.
- Video Legal YCC – the picture will be YCC legalised according to the YCC clip and knee settings.
- Video Legal Comp – the picture will be Composite legalised according to the Composite clip and knee settings.
- Video Legal Comp + RGB – the picture will be firstly Composite legalised, and then RGB legalised.

### 3.2.3 Setting the legaliser domain

It is important to note that in order for the unit to do the correct colour space conversion required, the manner in which the data is converted needs to be specified. This must be done regardless of which type of legalisation is required!

This is selected from the below menu found by navigating to Setup→Comp:



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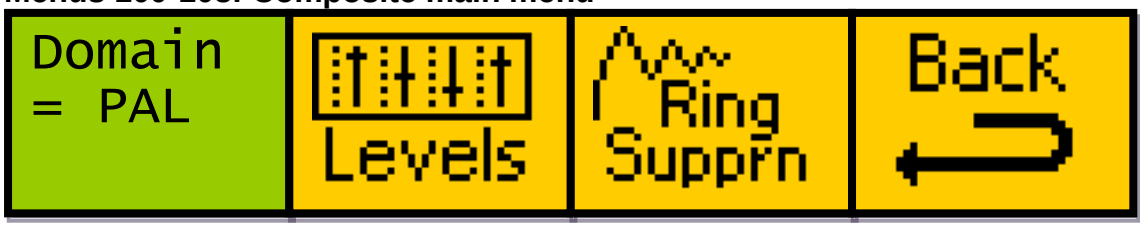
**Menus 100-103: Composite main menu**




The domain options are listed below:

- Auto – This uses the frame rate to calculate which conversion to use
  - 29.97fps, 30fps, 59.94fps and 60fps means NTSC with pedestal (7.5IRE) will be used
  - 25fps and 50fps means PAL will be used
  - Other detected standards, including 23.98fps and 24fps will use PAL colour space conversion when in auto mode.
- PAL
- NTSC
- NTSC with 7.5 IRE offset (a.k.a. pedestal)

The unit default mode is 'Auto'.

The domain has an effect on a certain number of menus which will display either in mV or in IRE. For a few menus, different values are stored for each mode, so (for example) switching from PAL to NTSC will switch to using the NTSC menus for those few variables, rather than converting the PAL values into NTSC equivalents.
The values treated in this way are listed below:

- High Comp Y clip and knee
- Low Comp Y clip and knee
- High Comp C clip and knee
- Low Comp C clip and knee
- Proc amp gain, black lift value
- Ring suppression high and low clip

## 3.2.4 Selecting the legaliser values

### RGB legalisation

Setting the RGB legaliser values is done via the below menus, which is found under Setup→RGB/YCC→RGB Setup

**Menus 36-39: RGB high clip and knee**

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The basic form of the RGB legaliser is shown in Figure 10. In RGB mode the legaliser first converts the video from the YCbCr colour space to the RGB colour space. The RGB data is then soft clipped according to the settings for RGB High Clip & Knee and RGB Low Clip & Knee. Finally the clipped RGB data is converted back to the YCbCr colour space. The RGB legal colour space is a subset of the composite legal colour space so an RGB legal signal is also composite legal but the reverse is not true.

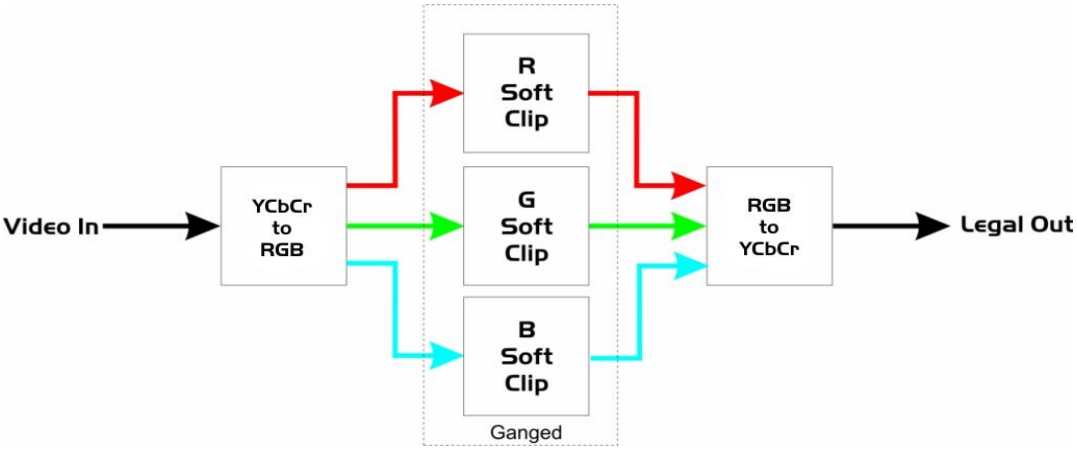
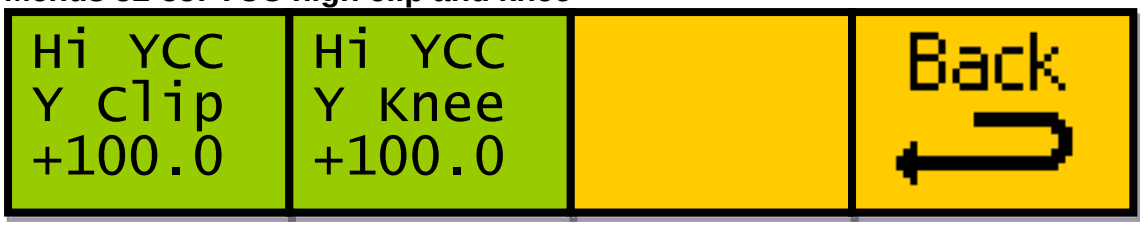



**Figure 10: RGB Legaliser Structure**

### YCC Legalisation

Setting the YCC legaliser values is done via the below menus, which are found under Setup→RGB/YCC→YCC Setup

**Menus 52-55: YCC high clip and knee**




The basic form of the YCC legaliser is shown in Figure 11: YCC Legaliser Structure. In YCC mode the legaliser provides direct clipping of the raw YCbCr data using separate clip and knee parameters for the Y and colour difference components.



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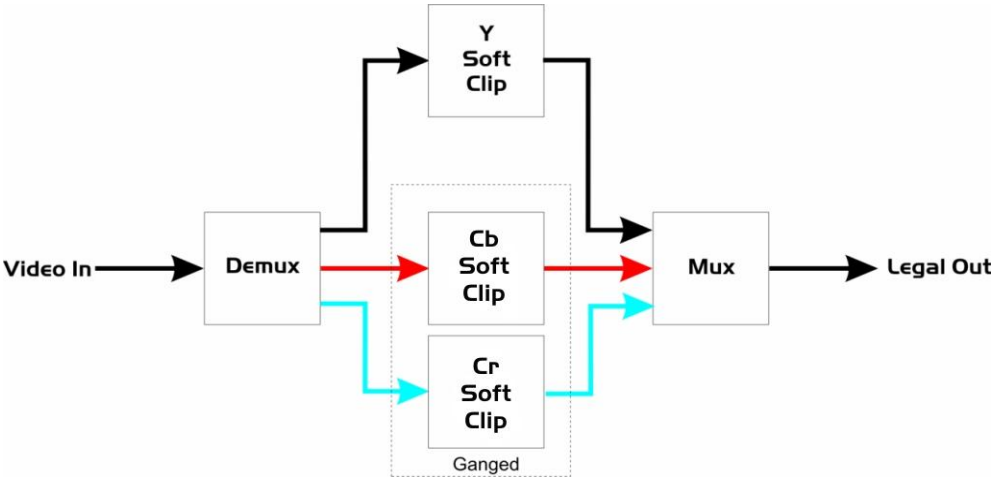
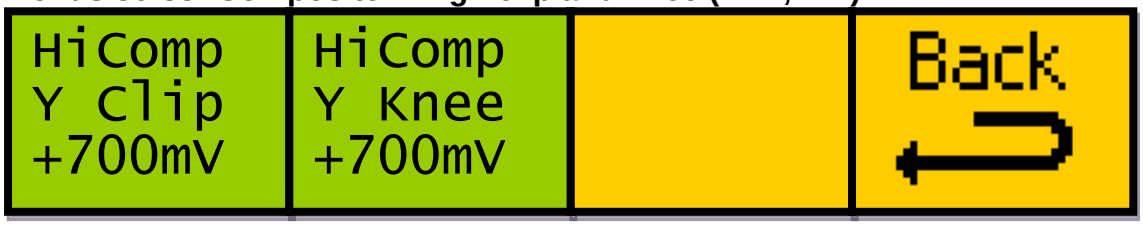



**Figure 11: YCC Legaliser Structure**

### Composite legalisation

Setting the YCC legaliser values is done via the below menus, which are found under Setup→RGB/YCC→YCC Setup

**Menus 80-83: Composite Y high clip and knee (PAL, mV)**




The basic form of the composite legaliser is shown in Figure 12: Composite Legaliser Structure**Error! Reference source not found.**. In composite mode the legaliser restricts the Y, Cb & Cr components such that when the signal is converted to a composite waveform the Y component stays within the range allowed by the Y High Clip and Y Low Clip and the total composite waveform stays within the range defined by Comp High Clip and Comp Low Clip.
The legaliser works by selectively reducing the saturation of pixels which would otherwise result in over modulation of the composite waveform. Composite mode preserves the hue of each pixel but not the saturation.

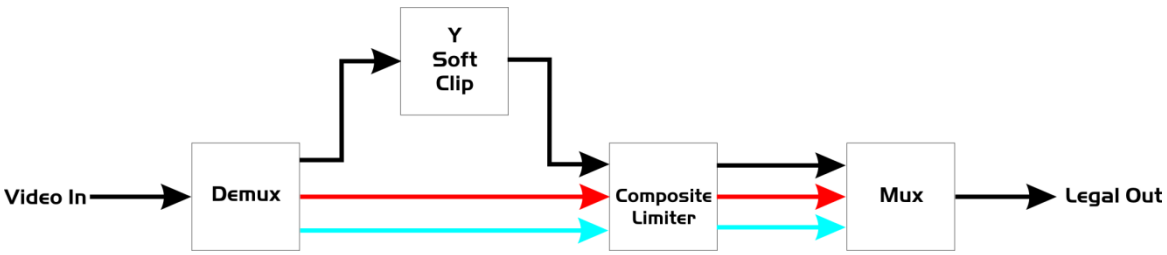



**Figure 12: Composite Legaliser Structure**



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### Comp + RGB mode

The video signal is legalised as described in the **Composite legalisation** section, and then the legalised signal is passed through a second legaliser as specified in the **RGB legalisation** section.

### Clip & Knee

Many of the legaliser functions present Clip and Knee parameters to the user. The Clip parameters specify the maximum and minimum values the system legaliser will allow to pass. **Figure 13** shows an illegal input to the clipper with detail in the illegal highlight and lowlight areas of the signal. When the knee values are set to the same value as their respective Clips the legaliser operates as a hard-clipper as shown in **Figure 14** show shows the now legal signal but the detail in the highlights and lowlights has been lost. **Figure 15** shows the same input signal legalised with a 10% difference between the Clips and their respective Knees. The highlight/lowlight detail has been compressed into the legal region at the expense of some of the dynamic range of the originally legal part of the waveform.


**Figure 13: Illegal Source**



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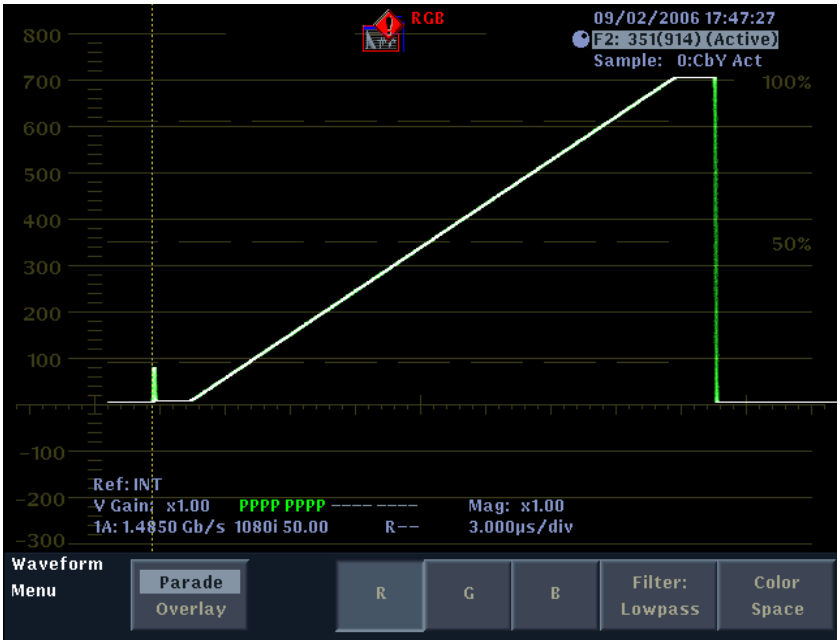


**Figure 14: Hard Clipped Output**

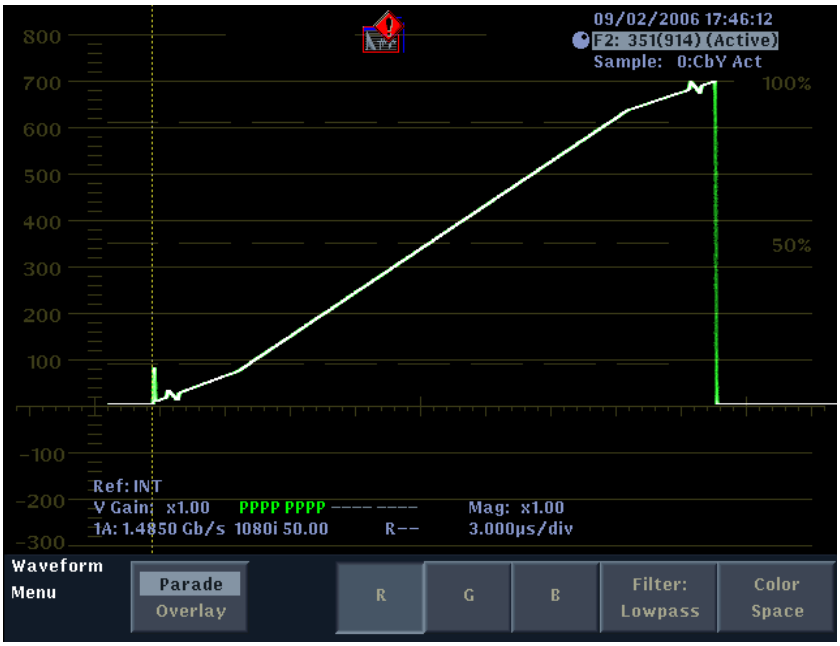


**Figure 15: Soft Clipped Output**

## 3.2.5 Proc Amp

Setting the proc amp values is done from the following menu, which is found under Setup→Lift/Gain:



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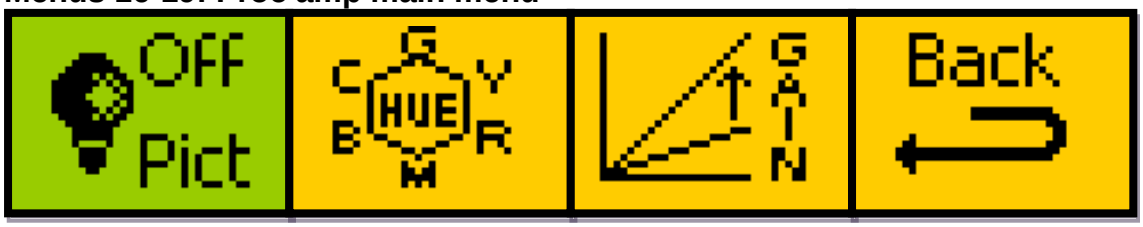
**Menus 16-19: Proc amp main menu**




The proc amp enables the luma gain to be adjusted from 0 to 200%, Similarly the chroma also is adjustable from 0 to 200%. Full 10 bit by 10 bit multipliers are used with a rounded 10 bit product. Black level adjustment is also applied at this point as is hue adjustment which allows for ±180° of hue rotation.

### 3.2.6 Recalling settings when video standard is changed

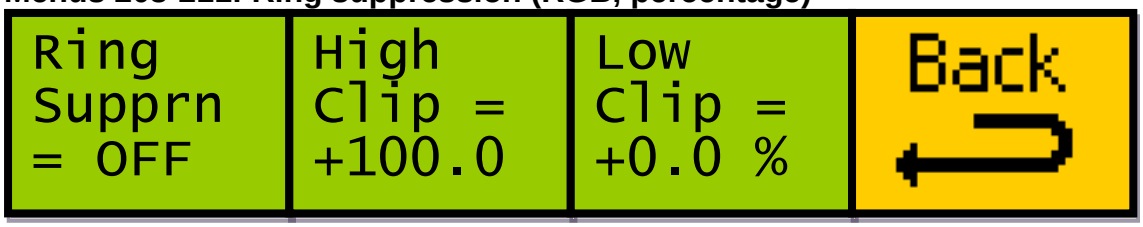
When the menu settings are changed the new values are automatically backed up to non-volatile memory. When the video standard is changed the previous settings for that standard are automatically restored.

## 3.3 Advanced features of the LE-3G

### 3.3.1 Ring suppression

Ring suppression is controlled from the following menu, found by navigating to Setup→Comp→Ring Supprn:

**Menus 208-211: Ring suppression (RGB, percentage)**




Ring suppression can either be OFF, MANUAL, AUTO or DISABL. In auto mode, the high and low settings for the current legalisation type are used as the high and low clip values for the ring suppression. **'DISABL' will be displayed when legaliser mode is in RGB only or YCC as ring suppression isn't supported in these modes.**

There are 3 different instances of this menu; one for RGB (in percent, as shown above), one for PAL (in mV) and one for NTSC (in IRE). The displayed menu will depend on the legalisation required, and the domain selected. Changes to the values within these menus are not copied across all three instances, so settings for PAL, NTSC and RGB are all stored separately.



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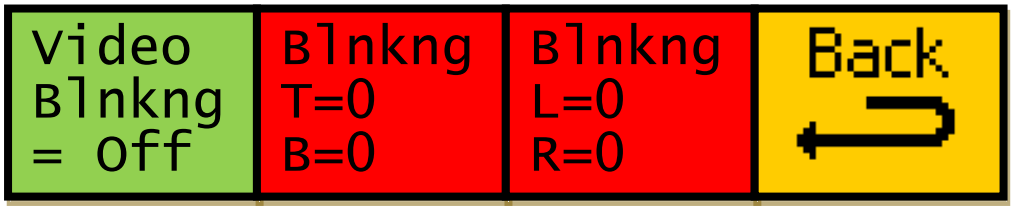
### 3.3.2 Adjusting the input picture blanking

Adjustment of the input picture blanking parameters uses the menu below, found under “Utils → Blank”




The blanking is defined as the number of pixels in from the edge of the input video picture that you want to be blanked off.

- T is the number of pixels of blanking from the top of the picture
- B is the number of pixels from the bottom of the picture
- L is the number of pixels from the left edge of the picture
- R is the number of pixels from the right edge of the picture
- By default, all blanking variables are set to zero
- Video Blanking defaults to “Off”.

### 3.3.3 KARMAudioRT Loudness and true-peak control – these menus are only operational with the KARMAudioRT option (-K)

The LE-3G has 4 independent channels of KARMAAudioRT each allowing loudness/peak correction of up to 6 embedded audio channels (surround sound 5.1). This means 4 lots of 5.1 can be corrected simultaneously (or stereo or any mixture of embedded audio channel numbers).

Each KARMAudioRT channel provides real-time automatic control of peak multi-channel embedded audio loudness as measured using then ITU-R BS.1770 multi-channel loudness algorithm. KARMAudioRT also provides real-time per-channel true-peak limiting as measured by the ITU-R BS.1770 true-peak estimation algorithm.

In order to control peak loudness KARMAudioRT continually calculates the multi-channel short-term loudness and compares this to the loudness limit. If the loudness limit is exceeded the audio gain for all channels selected for KARMAudioRT reduces at the rate set in the loudness attack menu until the short-term multi-channel loudness falls below the defined limit. While the short-term multi-channel loudness is below the defined limit the audio gain will increase, to a maximum of unity (or the level set in menu 177 below), at the rate defined by the loudness decay menu.
This loudness value used can come from either a short travelling window (400mS), a medium travelling window (3S) or an integrated value resettable by the user.

After the loudness control stage each audio channel is analyzed individually for true-peak limiting. Where the estimated true-peak value of a channel exceeds the Peak Knee value the source audio is adjusted according to the Clip and the Peak



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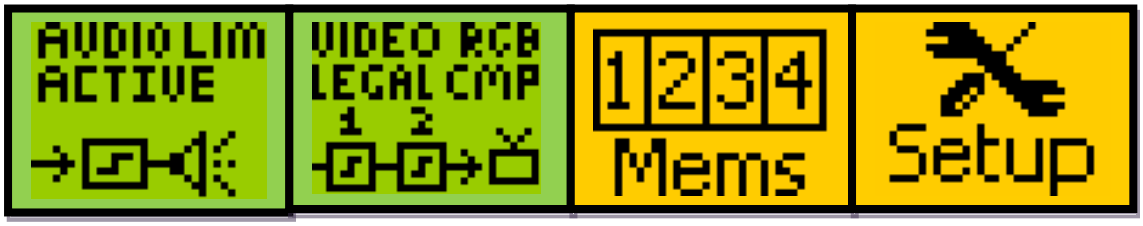
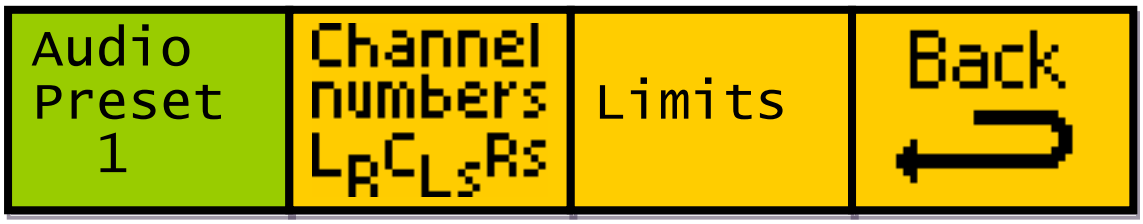
Compression to restrict the true-peak value to fall between the Peak Knee and Peak Clip values. By employing peak compression audio distortion is minimised.



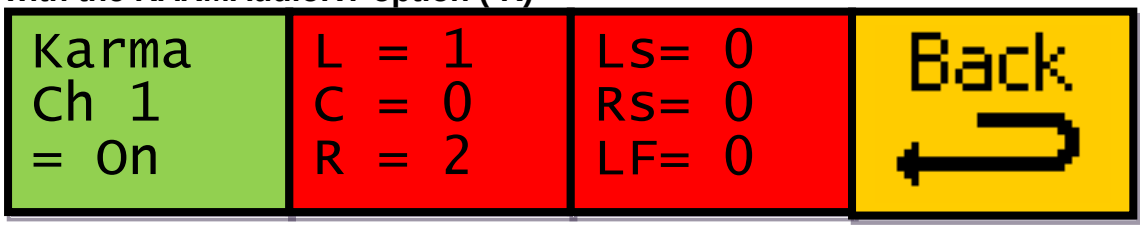

The KARMAudio Active/Bypass button on the top level menus will toggle the KARMAudioRT audio processing on and off if the unit has been licensed for the –K option. Operation of the KARMAudioRT is independant of the legaliser operation i.e. putting the legaliser into bypass will not bypass the KARMAudioRT processing.

KARMAudioRT is controlled from the following menus, found from the top level menu by navigating to Setup→ KARMAudioRT:




**Audio Preset** - The KARMAudioRT settings are recalled by the 'Audio Preset' menu above. Presets are saved by pressing the left most digipot which alters the Audio Preset number. **Preset number 1 will be automatically recalled on power-up and so use this preset as a power on reset memory.**

**Menus 244-247: KARMAudioRT Channels - this menu is only operational with the KARMAudioRT option (-K)**




The first menu will selectively set this Karma Audio channel on/off. There are 4 Karma audio channels (accessed by the next/prev buttons), with each able to select up to 6 different embedded audio channels to be included in it's loudness and peak correction. The other menus select the embedded audio channel numbers (1 thru 16) that the KARMAudioRT loudness/peak processing is performed on. Setting a channel to 0 will result it in being excluded from the KARMAudioRT calculations and processing. Press any red menu to access the individual parameters. Only the channels identified will be processed by the KARMAudioRT processing**. For a karma channel to work correctly L and R should not be set to 0.**



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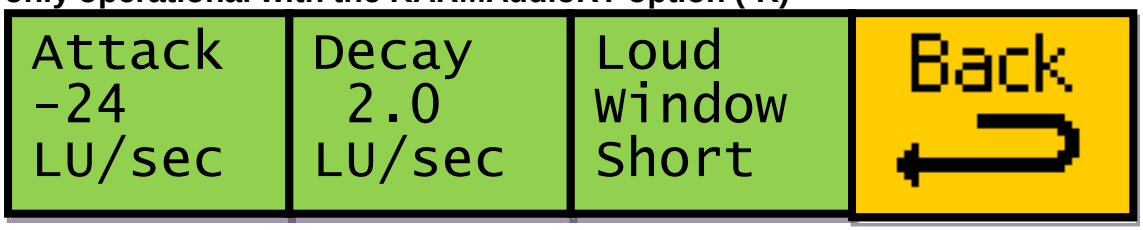
**Menus 176-179: KARMAudioRT Limits menu – this menu is only operational with the KARMAudioRT option (-K)**


**Limit** - this menu sets the loudness limit above which the audio gain will begin to reduce.
**Gain** – **(For normal Karma operation this should be set to 0)** Karma audio could originally only attenuate the program audio level to maintain the level of Audio Loudness. Now this parameter can set the maximum amount of allowable audio gain in 1 db steps from 0db to +24db (0db being unity and the level at which the standard Karma works already). Gain will increase when the measured Audio Loudness drops below the required level (normally -23 or -24 LUFS/LKFS), the rate of gain increase/decrease will be controlled by the already present decay and attack rates set in other menus within Karma audio.

**Thr (Threshold)** - During very quiet/silence periods of program audio the Karma audio can increase to the maximum allowed level which can allow short bursts of loud amplified audio to be present when the program audio returns. To cover this case a threshold/gated menu has been added ranging from +5 to -40 LUFS/LKFS. This means that any program audio detected at lower than this level of Audio Loudness will not cause any increase in the internal amplification level of Karma audio (when gain menu above is set to any level apart from 0).
**Reset Karma** – This will reset the continuously running integrated loudness average used in the 'Loud Window' menu below.

**Menus 248-251: KARMAudioRT Loudness processing menu – this menu is only operational with the KARMAudioRT option (-K)**




**Attack/Decay** - these menus allow configuration of the loudness processing parameters. The Attack parameter effects how rapidly the audio gain is reduced when the loudness limit is exceeded. The Decay parameter controls how quickly the audio gain recovers to unity after a loudness control event.
**Loud Window** - controls the length of the window average used in the loudness calculation (Short = 400mS, Medium = 3S, Intega = continuous average from when Karma Reset is pressed).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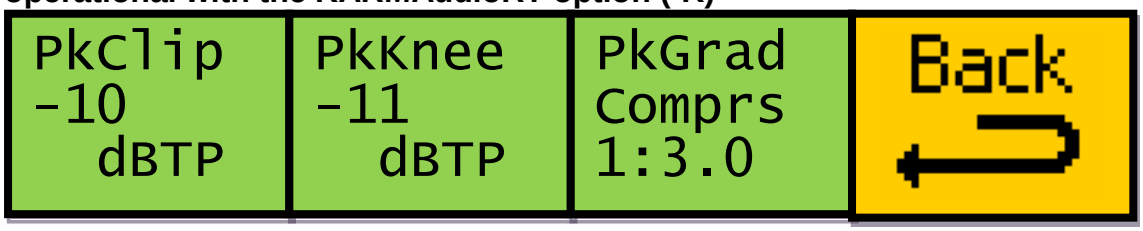
**Menus 240-243: KARMAudioRT Peak processing menu – this menu is only operational with the KARMAudioRT option (-K)**




These menus configure the peak processing parameters. Peak processing becomes active above the PKKnee level and all values between PKKnee and PKKnee + ((PKClip – PKKnee)/compression) are soft limited. Values above PKKnee + ((PKClip – PKKnee)/compression) are hard clipped. For the default values true-peak levels below -11 dBTP are unaffected, true-peak levels between -11dBTP and -8dBTP are soft limited and all true-peak levels above -8dBTP are hard limited. Memories

### 3.3.4 Power on memory

On power up, this product will automatically load the settings it had the last time it had power.

### 3.3.5 Preset memories

There are 6 preset memories, which set the unit up with some common settings. These are outlined below:

PAL normal:

- Legalisation method to ‘Comp’
- Ring suppression off
- Comp Y high clip and knee to 700mV
- Comp Y low clip and knee to 0mV
- Comp C high clip and knee to 930mV
- Comp C low clip and knee to -230mV
- Comp domain to PAL

NTSC normal:

- Legalisation method to ‘Comp’
- Ring suppression off
- Comp Y high clip and knee to 100.0 IRE
- Comp Y low clip and knee to 0.0 IRE
- Comp C high clip and knee to 120.0 IRE
- Comp C low clip and knee to -33.0 IRE
- Comp domain to NTSC 7.5 IRE

Bypass All:

- Legalisation method to ‘off’
- Ring suppression off

0-100% RGB:



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- Legalisation method to ‘RGB’
- RGB high clip and knee to 100.0%
- RGB low clip and knee to 0.0%
- Ring suppression off

EBU103 Tight:

- Legalisation method to ‘RGB’
- RGB high clip and knee to 103.0%
- RGB low clip and knee to -1.0%
- Ring suppression off

EBU103 Normal:

- Legalisation method to ‘RGB’
- RGB high clip and knee to 101.0%
- RGB low clip and knee to 0.0%
- Ring suppression off

Please note that no settings other than those listed above are changed when loading these presets.

### 3.3.6 User Memories

The user memories are a generic feature of all eyeheight geNETics products. The **LE-3G** has six presets for common legalisation standards and six user memories, which are initially named, ‘user Mem 1’ through to ‘user mem 6’.

To save to a user memory, set up the unit as required and navigate to Setup→ System→Mems→USER Preset, then save the settings from either of the menus shown below:

**Menus 168-171: User memories menu 3/4**

| | | | |
|---|---|---|---|
| user mem 1 Save | user mem 2 Save | user mem 3 Save | next→ *BACK* prev→ |

**Menus 172-175: User memories menu 4/4**

| | | | |
|---|---|---|---|
| user mem 4 Save | user mem 5 Save | user mem 6 Save | *BACK* prev→ |

To show this memory as the loaded memory you will need to immediately load it once it’s saved, using the appropriate ‘user mem recall’ button.



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### 3.3.7 Naming User Memories

The user memories can be named with up to 12 characters. To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. (See Figure 6: **LE-3GS or LE-3GM** connections for connector location). To name memory 1, "625v1 050309"

1. Hit F9 function key. The LCD displays will change to text entry mode.
2. Type "M01: 625v1 " and then press enter.
3. Type "M02: 050309" and then press enter.
4. You may get a "not acknowledged" message from either of the above; this does not matter.

Other memories can be named in the same way but changing the 01 and 02 to other numbers (for user memory 2 use 03 and 04, for mem 3 use 05 and 06, etc.).

## 3.4 Tamper Locking the LE-3G

The user can lock specific menus or all the menus on the **LE-3G** so that it cannot be adjusted with a manual control panel. This does not effect automation.
To do this plug in a PS-2 Keyboard into a Flexipanel and select the appropriate processor card with a device button. (See Figure 7: Flexipanel (FP-9) controls. for connector location). To lock only menu 5:

1. Hit F9 function key. The LCD displays will change to text entry mode
2. Type "L05:" and then press enter.

A padlock symbol will appear on the menu and it cannot be adjusted. To unlock menu 5, type "A05:" as step 2 above. Other menus are done in the same way
To lock the whole product type "L:" as step 2 above and to unlock the whole product type "A:" as step 2 above.

### 3.4.1 Globally locking the user menus

Hold in the DEVICE SELECT button to which the LE-3G is assigned until a message is displayed on the menus informing you that "User has LOCKED menus" or "User has UNLOCKED menus".

## 3.5 GPI/Tally Set-up

### 3.5.1 On-Board GPI's

The **LE-3G** is a geNETics product. The geNETics system uses generic Input/Output cards which have 2 GPI's. These GPI's activate the first 2 user memories in the system.

GPI 1 - Activate User Memory 1
GPI 2 - Activate User Memory 2

Activate = Short to ground or logic 0V. See Appendix.



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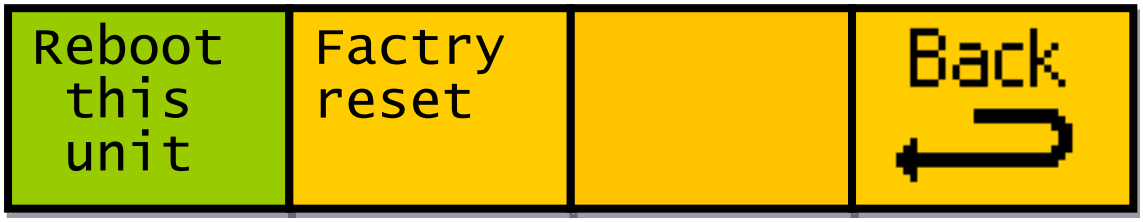
### 3.5.2 Configuring tallies on the etherbox

The **LE-3G** can use an etherbox tally to indicate that it is is bypass (no processing) mode
The etherbox chassis has three usable tallies. These are Tallies 11, 12 and 13. Set up menu 121 for the box number and tally number that you wish to use. If you do not wish to use a tally set the box number to 0. Refer to the etherbox manual for interface information.

## 3.6 Resetting the LE-3G

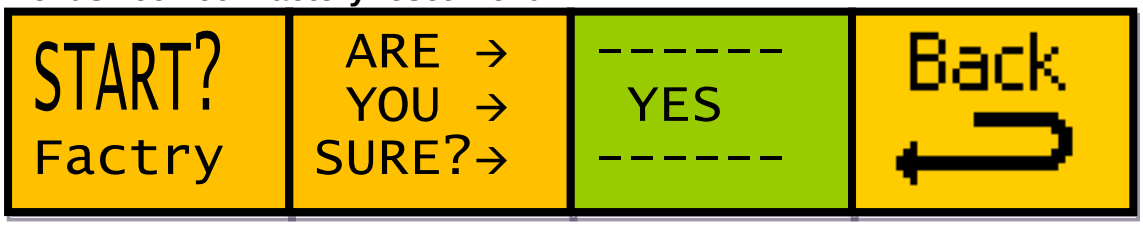
There are 2 types of resets available which don't involve removing the **LE-3G** from the chassis. Both of these are available from the following menu, navigated to via Setup→System→Resets:

**Menus 188-191: Resets menu**




The 'reboot this unit' option will have the same effect as removing power to the LE-3G, without having to have physical access to the unit. If the unit exhibits unusual behaviour, this is a good action to take and may correct the problem. It is likely, however, that output video will be slightly interrupted as the unit resets, so doing this while on-air is not recommended.

The 'factory reset' option will display the following menu:
**Menus 196-199: Factory reset menu**




Pressing "YES" will restore all the factory default settings and will clear all the memories.
**WARNING!** Performing a factory reset will permanently erase all user memories that have been stored, as well as erasing the current power-on default setting.

## 3.7 Software upgrade

Navigate to the following menu, under "Setup→System→Ver'ns"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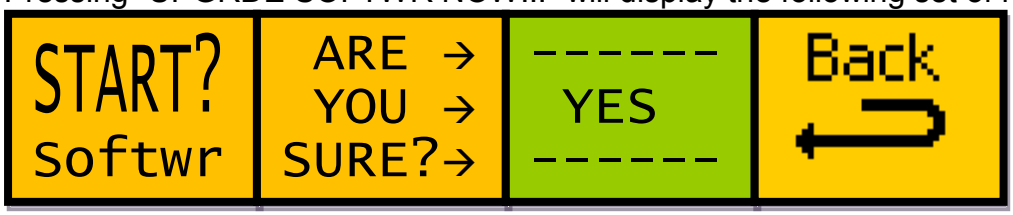
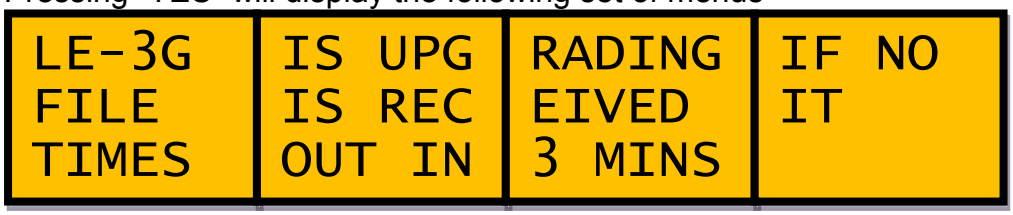
Pressing “UPGRDE SOFTWR NOW!!!” will display the following set of menus




Pressing “YES” will display the following set of menus




The unit will be set into the state where it can be field upgraded using the “Flasher” software which can be downloaded from our web site: www.eyeheight.com



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# 4 The LE-3G Menu Set

The following set of menus defines the operational controls of the **LE-3G**.
Note: Only parameters with **RED** menu numbers are stored in the memories, and are also saved automatically as soon as they are changed.

**Menus 00-03: Top Level Menus**


| Menu Num. | Heading | Function |
|---|---|---|
| **0** | Audio Levelling Mode | Audio Limit Bypass – No audio processing is done<br><br>Audio Limit Active – This applies the settings that the user sets in the KarmAudio setup menus. |
| **1** | Legaliser mode | This menu selects the required legalisation mode between off, RGB, YCC, comp or comp & RGB. |
| 2 | Memories | Pressing this takes you to the Preset and user memories. (Go To Menus 148-151) |
| 3 | Setup | Pressing this will take you to the first of the nested setup menus (Go To **Menus 04-07**) |

**Menus 04-07: Main menu set 1/2**


| Menu Num. | Heading | Function |
|---|---|---|
| 4 | RGB/YCC legal menu | Pressing this button takes you to the RGB and YCC legalisation settings menus (Go To **Menus 28-31**) |
| 5 | Composite legal menu | Pressing this button takes you to the Composite legalisation settings menu, which includes the ring suppression (Go To **Menus 100-103**) |
| 6 | KARMAudioRT | Pressing the button takes you to the |



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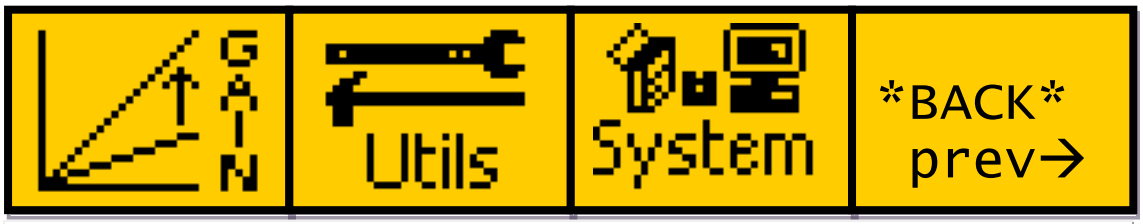
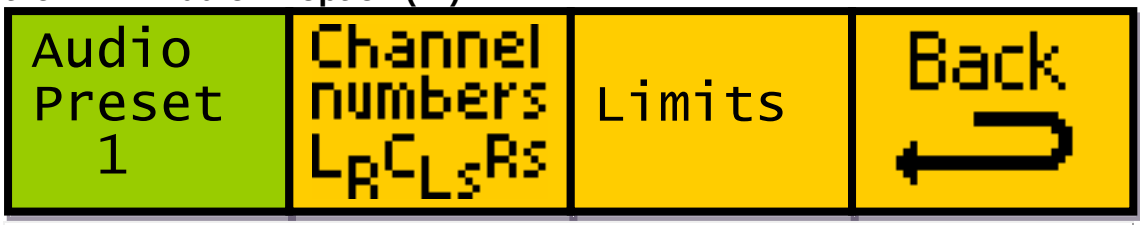
| | | |
|---|---|---|
| | audio processing settings | KARMAudioRT setup menu (Go To **Menus 12-15**) **–** these menus are only operational with the KARMAudioRT option (-K) |
| 7 | Back | Pressing this button takes you to the previous level of menus (Go To **Menus 00-03**)<br><br>Pressing the **next** button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 08-11**) |

**Menus 08-11: Main menu set 2/2**




| Menu Num. | Heading | Function |
|---|---|---|
| 8 | Proc amp menu | Pressing this button takes you to the Proc amp settings menu (Go To **Menus 16-19**) |
| 9 | Utilities menu | Pressing this button takes you to the utilities menu (Go To **Menus 120-123**) |
| 10 | System menu | Pressing this button takes you to the system menu (Go To **Menus 180-183**) |
| 11 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 00-03**)<br><br>Pressing the **prev** button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 04-07**) |

**Menus 12-15: KARMAudioRT menus – this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|



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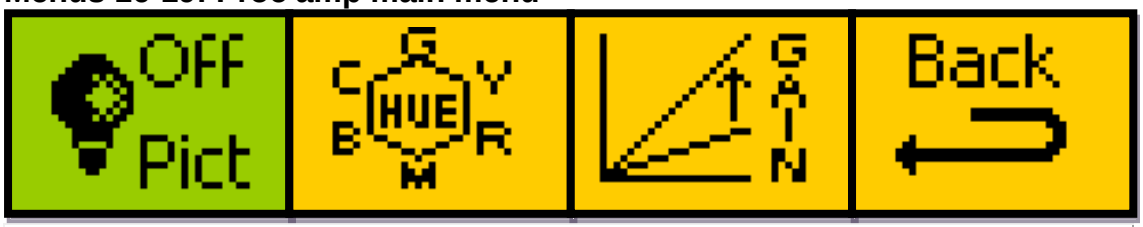
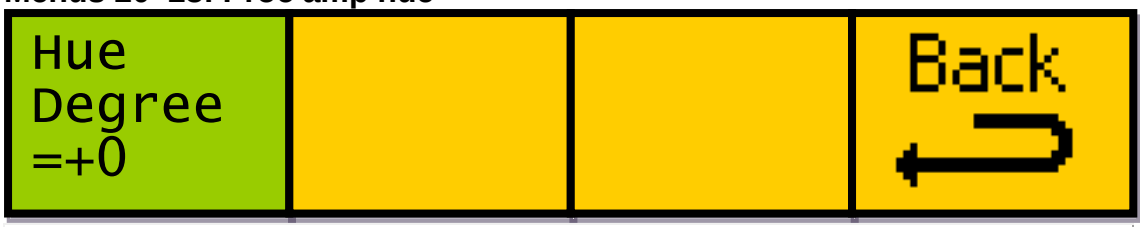
| | | |
|---|---|---|
| 12 | KARMAudioRT Presets | This selects one of 8 preset which control Karma audio levels/settings. Press digipot to store current levels/settings into preset number displayed |
| 13 | Loudness Channels menu | Pressing the button takes you to the Peak Loudness menu (Go To **Menus 104-107**) |
| 14 | Limits menu | Pressing the button takes you to the Limits menu (Go To **Menus 176-179**) |
| 15 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**) |

**Menus 16-19: Proc amp main menu**




| Menu Num. | Heading | Function |
|---|---|---|
| **16** | Proc amp status | Pressing this button turns on or off the proc amp. |
| 17 | Hue menu | Pressing this button takes you to the hue menus (Go To **Menus 20–23**) |
| 18 | Gain menu | Pressing this button takes you to the gain menus (Go To **Menus 24-27**) |
| 19 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**) |

**Menus 20–23: Proc amp hue**




| Menu Num. | Heading | Function |
|---|---|---|
| **20** | Hue adjustment | This button sets the value of the hue adjustment, with a range of -180 to +180 degrees. |
| 21 | --- | --- |
| 22 | --- | --- |
| 23 | Back | Pressing the button takes you to the |



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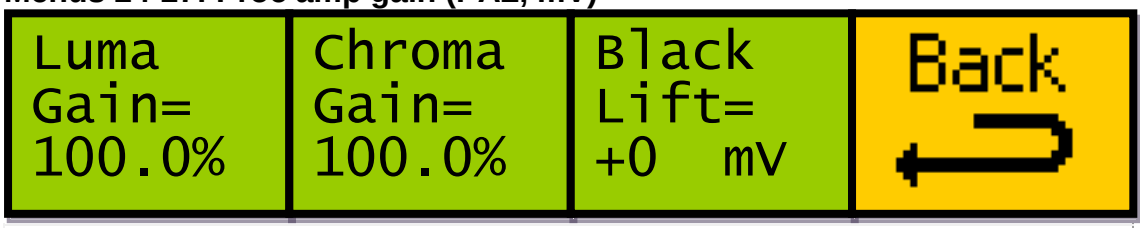
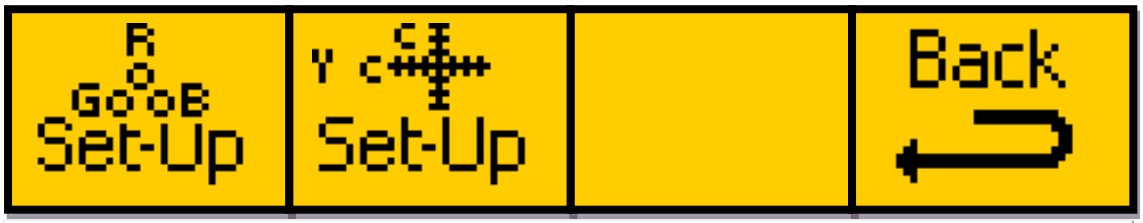
| | | |
|---|---|---|
| | | previous level of menus (Go To **Menus 16-19**) |

**Menus 24-27: Proc amp gain (PAL, mV)**



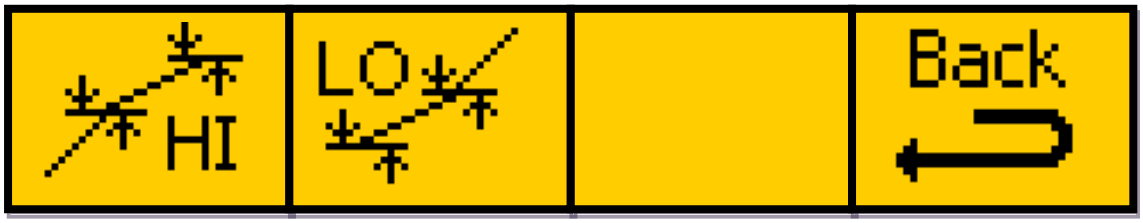

| Menu Num. | Heading | Function |
|---|---|---|
| **24** | Luma gain adjustment | This menu adjusts the luma gain between 0% and 200%. |
| **25** | Chroma gain adjustment | This menu adjusts the chroma gain between 0% and 200%. |
| **26** | Black lift | This menu adjusts the black lift between -200mV and +200mV. |
| 27 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 16-19**) |

**Menus 28-31: RGB/YCC main menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 28 | RGB setup | Pressing the button takes you to the RGB legalisation menu (Go To **Menus 32-35**) |
| 29 | YCC setup | Pressing the button takes you to the YCC legalisation menu (Go To **Menus 44-47**) |
| 30 | --- | --- |
| 31 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**) |

**Menus 32-35: RGB hi/lo menu**



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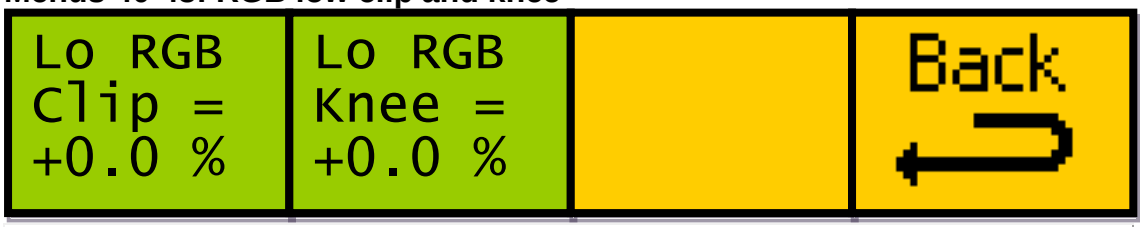
| Menu Num. | Heading | Function |
|---|---|---|
| 32 | RGB high clip and knee setup | Pressing the button takes you to the RGB high clip and knee adjustment menu (Go To **Menus 36-39**) |
| 33 | RGB low clip and knee setup | Pressing the button takes you to the RGB low clip and knee adjustment menu (Go To **Menus 40-43**) |
| 34 | --- | --- |
| 35 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 28-31**) |

**Menus 36-39: RGB high clip and knee**


| Menu Num. | Heading | Function |
|---|---|---|
| 36 | RGB high clip | This menu adjusts the high RGB clip value. Values are in percent. |
| 37 | RGB high knee | This menu adjusts the high RGB knee value. Values are in percent. |
| 38 | --- | --- |
| 39 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 32-35**) |

**Menus 40-43: RGB low clip and knee**




| Menu Num. | Heading | Function |
|---|---|---|
| 40 | RGB low clip | This menu adjusts the low RGB clip value. Values are in percent. |
| 41 | RGB low knee | This menu adjusts the low RGB knee value. Values are in percent. |
| 42 | --- | --- |
| 43 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 32-35**) |



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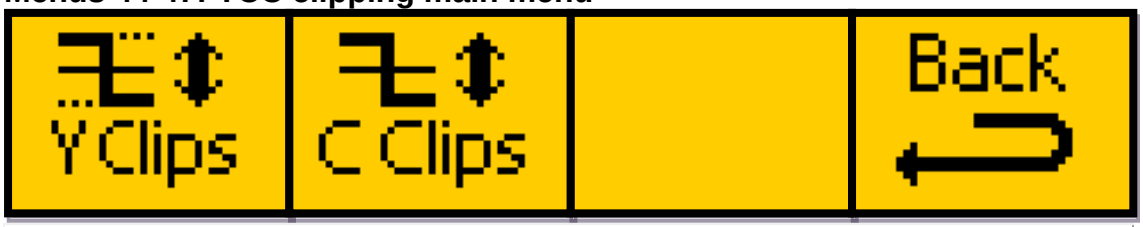
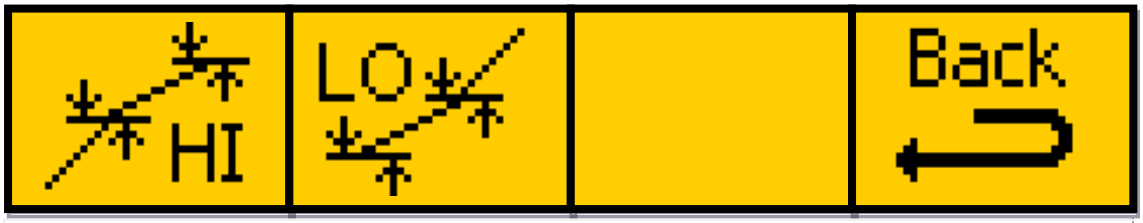
### Menus 44-47: YCC clipping main menu



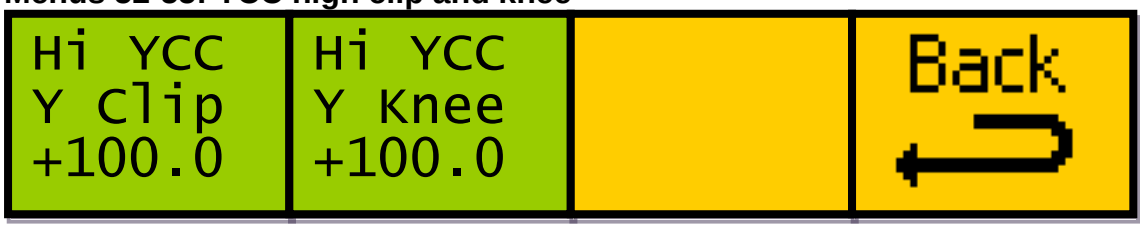

| Menu Num. | Heading | Function |
|---|---|---|
| 44 | YCC luma setup | Pressing the button takes you to the YCC luma menu (Go To **Menus 48-51**) |
| 45 | YCC chroma setup | Pressing the button takes you to the YCC chroma menu (Go To **Menus 60-63**) |
| 46 | --- | --- |
| 47 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 28-31**) |

### Menus 48-51: YCC Y hi/lo menu




| Menu Num. | Heading | Function |
|---|---|---|
| 48 | YCC luma high clip and knee setup | Pressing the button takes you to the YCC luma high clip and knee adjustment menu (Go To **Menus 52-55**) |
| 49 | YCC luma low clip and knee setup | Pressing the button takes you to the YCC luma low clip and knee adjustment menu (Go To **Menus 56-59**) |
| 50 | --- | --- |
| 51 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 44-47**) |

### Menus 52-55: YCC high clip and knee



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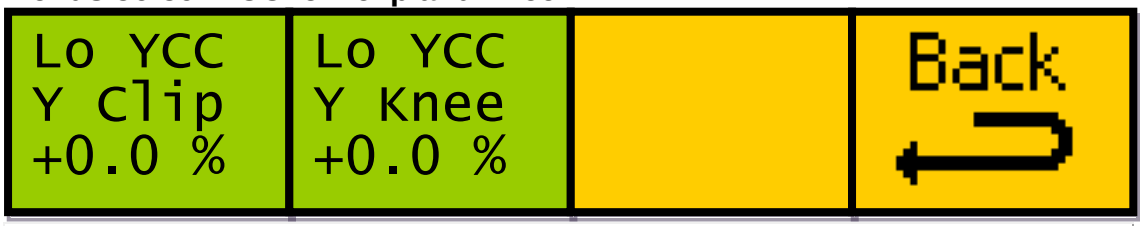
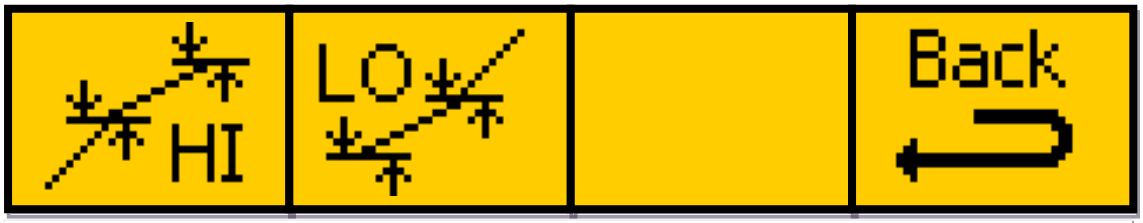
| Menu Num. | Heading | Function |
|---|---|---|
| 52 | YCC Y high clip | This menu adjusts the high YCC luma clip value. Values are in percent. |
| 53 | YCC Y high knee | This menu adjusts the high YCC luma knee value. Values are in percent. |
| 54 | --- | --- |
| 55 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 48-51**) |

**Menus 56-59: YCC low clip and knee**




| Menu Num. | Heading | Function |
|---|---|---|
| 56 | YCC Y low clip | This menu adjusts the low YCC luma clip value. Values are in percent. |
| 57 | YCC Y low knee | This menu adjusts the low YCC luma knee value. Values are in percent. |
| 58 | --- | --- |
| 59 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 48-51**) |

**Menus 60-63: YCC CC hi/lo menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 60 | YCC chroma high clip and knee setup | Pressing the button takes you to the YCC chroma high clip and knee adjustment menu (Go To **Menus 64-67**) |
| 61 | YCC chroma low clip and knee setup | Pressing the button takes you to the YCC chroma low clip and knee adjustment menu (Go To **Menus 68-71**) |
| 62 | --- | --- |



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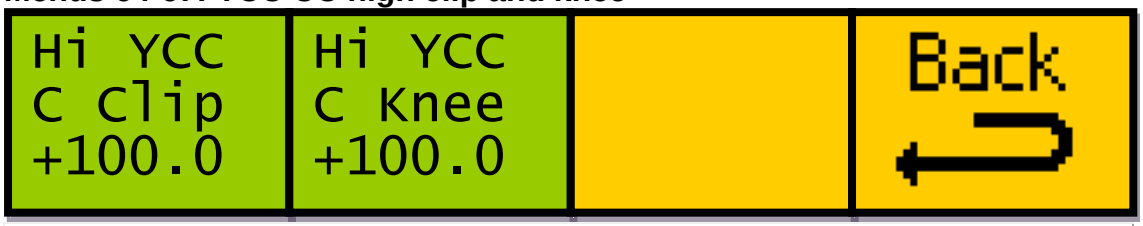
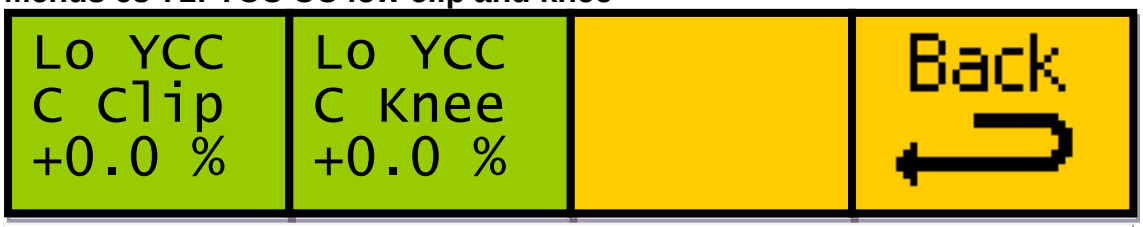
| | | |
|---|---|---|
| 63 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 44-47**) |

**Menus 64-67: YCC CC high clip and knee**




| Menu Num. | Heading | Function |
|---|---|---|
| 64 | YCC C high clip | This menu adjusts the high YCC chroma clip value. Values are in percent. |
| 65 | YCC C high knee | This menu adjusts the high YCC chroma knee value. Values are in percent. |
| 66 | --- | --- |
| 67 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 60-63**) |

**Menus 68-71: YCC CC low clip and knee**




| Menu Num. | Heading | Function |
|---|---|---|
| 68 | YCC C low clip | This menu adjusts the low YCC chroma clip value. Values are in percent. |
| 69 | YCC C low knee | This menu adjusts the low YCC chroma knee value. Values are in percent. |
| 70 | --- | --- |
| 71 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 60-63**) |



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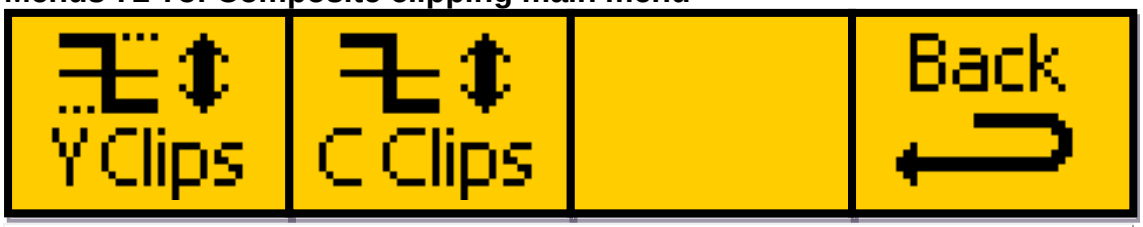
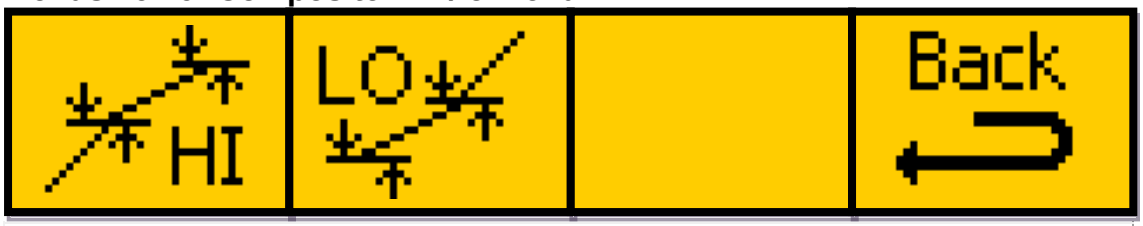
**Menus 72-75: Composite clipping main menu**



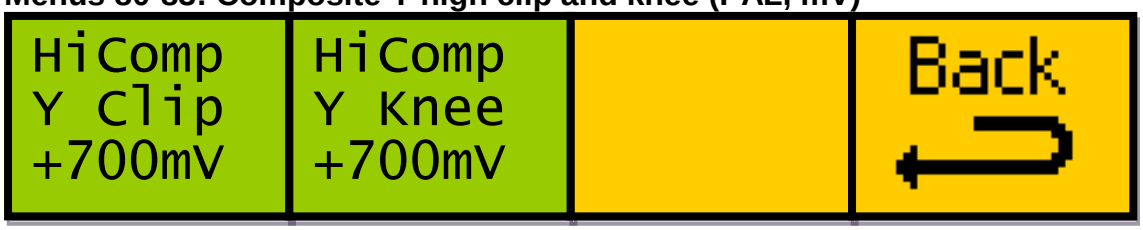

| Menu Num. | Heading | Function |
|---|---|---|
| 72 | Component luma setup | Pressing the button takes you to the Component luma menu (Go To **Menus 76-79**) |
| 73 | Component chroma setup | Pressing the button takes you to the Component chroma menu (Go To **Menus 88-91**) |
| 74 | --- | --- |
| 75 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**) |

**Menus 76-79: Composite Y hi/lo menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 76 | Comp luma high clip and knee setup | Pressing the button takes you to the Comp luma high clip and knee adjustment menu (Go To **Menus 80-83**) |
| 77 | Comp luma low clip and knee setup | Pressing the button takes you to the Comp luma low clip and knee adjustment menu (Go To **Menus 84-87**) |
| 78 | --- | --- |
| 79 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 72-75**) |

**Menus 80-83: Composite Y high clip and knee (PAL, mV)**



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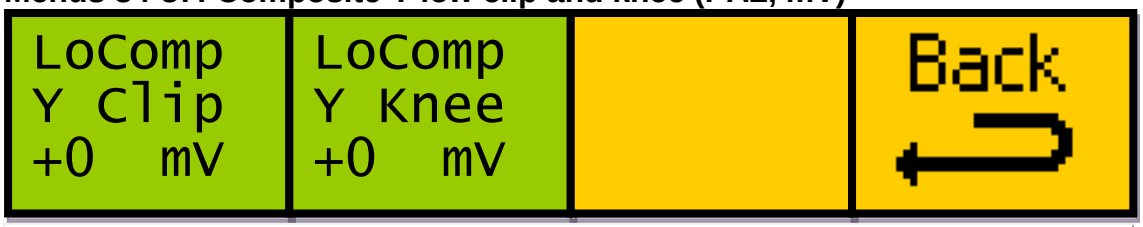
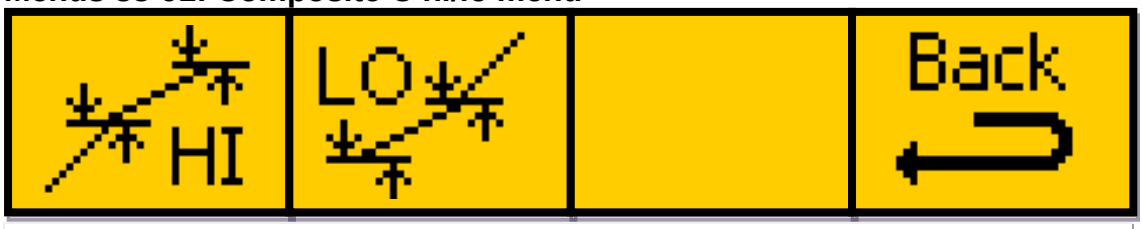
| Menu Num. | Heading | Function |
|---|---|---|
| 80 | Comp Y high clip | This menu adjusts the high Comp luma clip value. Values are in mV. |
| 81 | Comp Y high knee | This menu adjusts the high Comp luma clip knee value. Values are in mV. |
| 82 | --- | --- |
| 83 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**) |

**Menus 84-87: Composite Y low clip and knee (PAL, mV)**




| Menu Num. | Heading | Function |
|---|---|---|
| | Comp Y low clip | This menu adjusts the low Comp luma clip value. Values are in mV. |
| | Comp Y low knee | This menu adjusts the low Comp luma clip knee value. Values are in mV. |
| | --- | --- |
| | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**) |

**Menus 88-91: Composite C hi/lo menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 88 | Comp composite high clip and knee setup | Pressing the button takes you to the Comp composite high clip and knee adjustment menu (Go To **Menus 92-95**) |
| 89 | Comp composite low clip and knee setup | Pressing the button takes you to the Comp composite low clip and knee adjustment menu (Go To **Menus 96-99**) |
| 90 | --- | --- |



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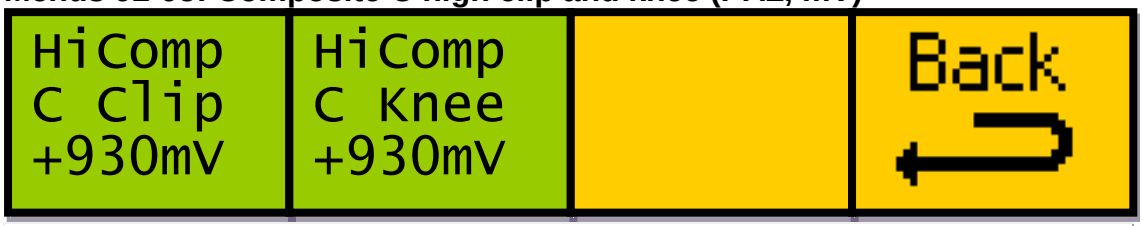
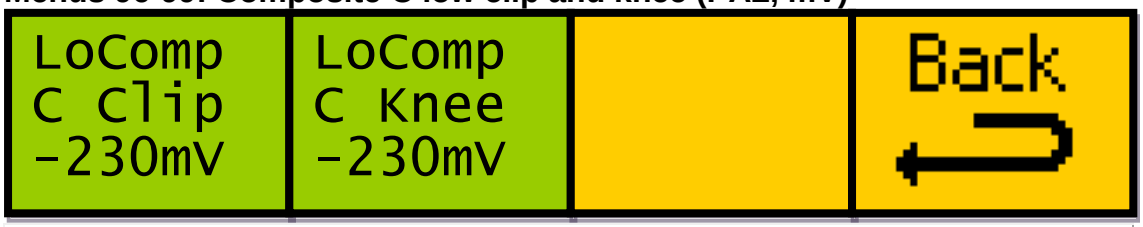
| | | |
|---|---|---|
| 91 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 72-75**) |

**Menus 92-95: Composite C high clip and knee (PAL, mV)**




| Menu Num. | Heading | Function |
|---|---|---|
| 92 | Comp C high clip | This menu adjusts the high Comp component clip value. Values are in mV. |
| 93 | Comp C high knee | This menu adjusts the high Comp component clip knee value. Values are in mV. |
| 94 | --- | --- |
| 95 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**) |

**Menus 96-99: Composite C low clip and knee (PAL, mV)**




| Menu Num. | Heading | Function |
|---|---|---|
| 96 | Comp C low clip | This menu adjusts the low Comp component clip value. Values are in mV. |
| 97 | Comp C low knee | This menu adjusts the low Comp component clip knee value. Values are in mV. |
| 98 | --- | --- |
| 99 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**) |



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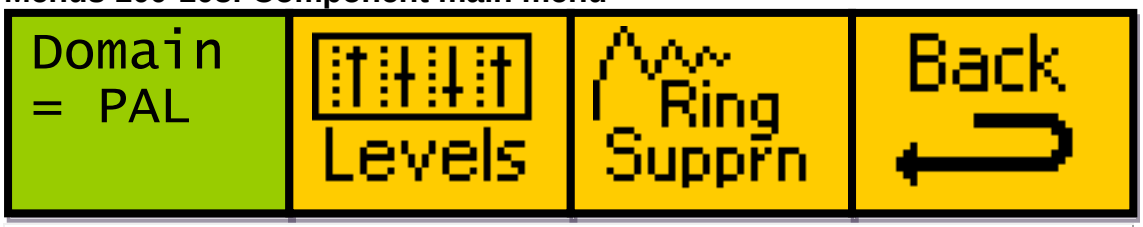
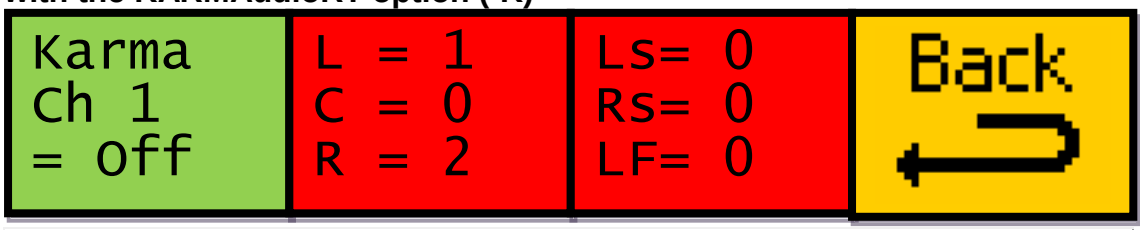
**Menus 100-103: Component main menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 100 | Legaliser domain | This menu sets the domain used by the legaliser.<br><br>For more information Go To **3.2.3** |
| 101 | Comp setup | Pressing the button takes you to the Comp settings menu (Go To **Menus 72-75**) |
| 102 | Ring suppression setup | Pressing the button takes you to the ring suppression settings menu (Go To **Menus 208-211**) |
| 103 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 04-07**) |

**Menus 104-107: KARMAudioRT Channel 1 - this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 104 | Karma Channel Enable | Turns this Karma channel on and off |
| 105 | L, C, R Chanel Numbers | Sets the embedded audio channel numbers for channels Left, Centre and Right. Setting 0 disables that channel in the loudness calculation and true-peak correction |
| 106 | Ls, Rs and LFE Channel Numbers | Sets the embedded audio channel Numbers for channels Left Surround, Right Surround and Low Frequency Effects. Setting 0 disables that channel in the loudness calculation and true-peak correction. The LFE channel is never included in the loudness calculation but is subject to loudness and true-peak correction if not set to 0 |



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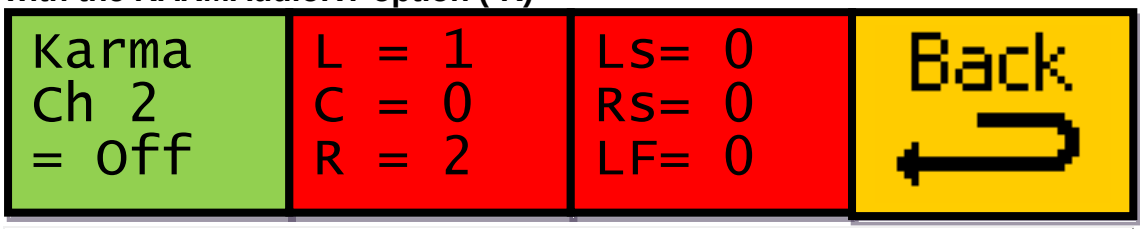
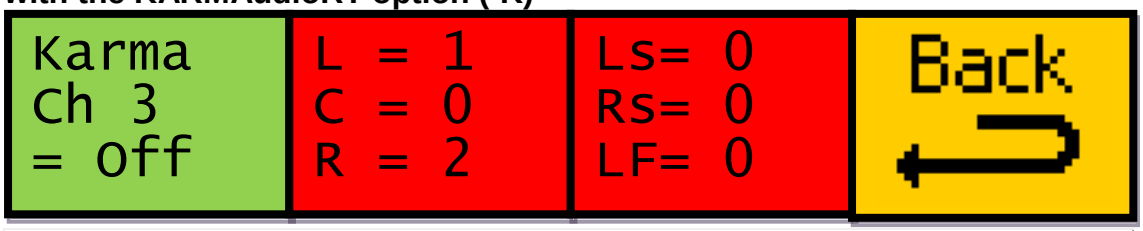
| | | |
|---|---|---|
| 107 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**) |

**Menus 108-111: KARMAudioRT Channel 2 - this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 108 | Karma Channel Enable | Turns this Karma channel on and off |
| 109 | L, C, R Chanel Numbers | Sets the embedded audio channel numbers for channels Left, Centre and Right. Setting 0 disables that channel in the loudness calculation and true-peak correction |
| 110 | Ls, Rs and LFE Channel Numbers | Sets the embedded audio channel Numbers for channels Left Surround, Right Surround and Low Frequency Effects. Setting 0 disables that channel in the loudness calculation and true-peak correction. The LFE channel is never included in the loudness calculation but is subject to loudness and true-peak correction if not set to 0 |
| 111 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**) |

**Menus 112-115: KARMAudioRT Channel 3 - this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 112 | Karma Channel Enable | Turns this Karma channel on and off |
| 113 | L, C, R Chanel Numbers | Sets the embedded audio channel numbers for channels Left, Centre and Right. Setting 0 disables that channel in the loudness calculation |



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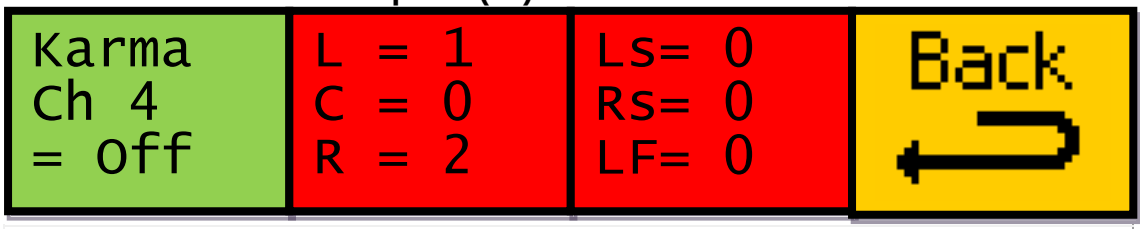
| | | |
|---|---|---|
| | | and true-peak correction |
| 114 | Ls, Rs and LFE Channel Numbers | Sets the embedded audio channel Numbers for channels Left Surround, Right Surround and Low Frequency Effects. Setting 0 disables that channel in the loudness calculation and true-peak correction. The LFE channel is never included in the loudness calculation but is subject to loudness and true-peak correction if not set to 0 |
| 115 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**) |

**Menus 116-119: KARMAudioRT Channel 4 - this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 116 | Karma Channel Enable | Turns this Karma channel on and off |
| 117 | L, C, R Chanel Numbers | Sets the embedded audio channel numbers for channels Left, Centre and Right. Setting 0 disables that channel in the loudness calculation and true-peak correction |
| 118 | Ls, Rs and LFE Channel Numbers | Sets the embedded audio channel Numbers for channels Left Surround, Right Surround and Low Frequency Effects. Setting 0 disables that channel in the loudness calculation and true-peak correction. The LFE channel is never included in the loudness calculation but is subject to loudness and true-peak correction if not set to 0 |
| 119 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**) |



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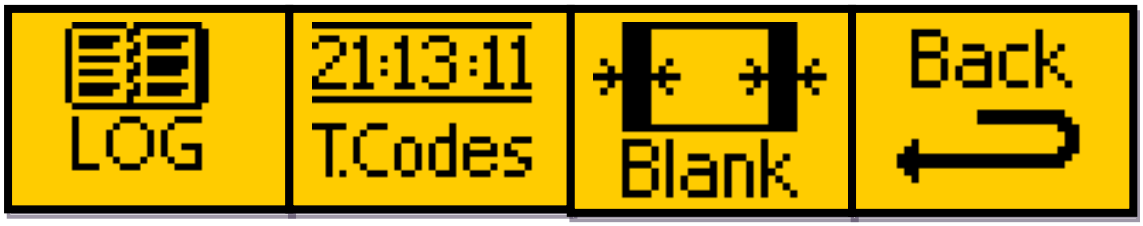
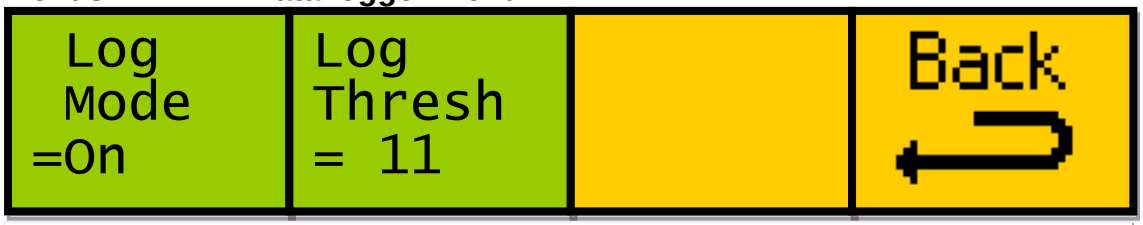
**Menus 120-123: Utilities menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 120 | Log mode settings | Pressing the button takes you to the logging setup menu (Go To **Menus 124-127**) |
| 121 | Time code settings | Pressing the button takes you to the time code setup menu (Go To **Menus 128-131**) |
| 122 | Blanking settings | Pressing the button takes you to the blanking setup menu (Go To **Menus 232-235**) |
| 123 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 08-11**) |

**Menus 124-127: Data logger menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 124 | Log mode enable | This menu enables or disables logging mode. |
| 125 | Log threshold | This menu sets the level at which an illegal pixel is considered a severe failure. |
| 126 | --- | --- |
| 127 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**) |



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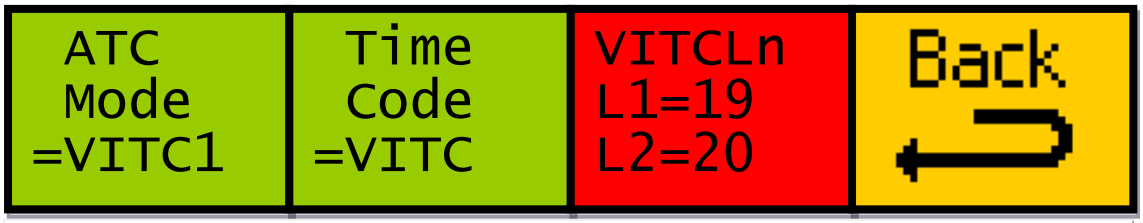
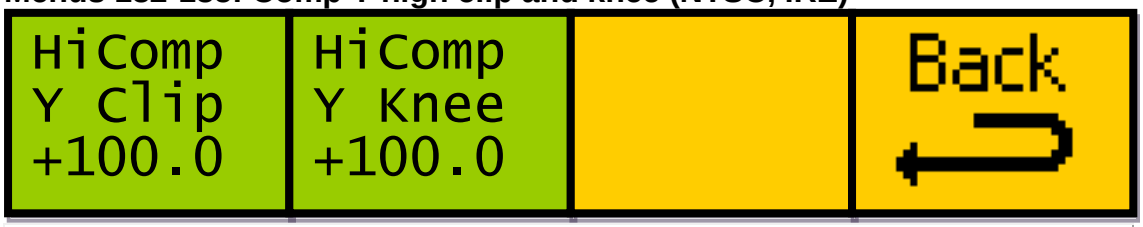
**Menus 128-131: Time code menu**



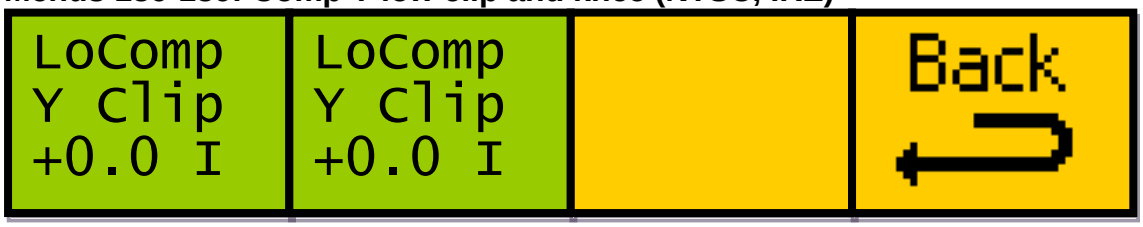

| Menu Num. | Heading | Function |
|---|---|---|
| 128 | ATC mode | This menu sets the Ancillary time code mode between LTC, VITC1 and VITC2.<br><br>For more information on the time code function Go To **Error! Reference source not found.** |
| 129 | Time code mode | This menu sets the time code mode to VITC, LTC or ATC. |
| 130 | VITC line numbers | This menu sets the VITC line numbers. |
| 131 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**) |

**Menus 132-135: Comp Y high clip and knee (NTSC, IRE)**




| Menu Num. | Heading | Function |
|---|---|---|
| 132 | Comp Y high clip | This menu adjusts the high Comp luma clip value. Values are in IRE. |
| 133 | Comp Y high knee | This menu adjusts the high Comp luma clip knee value. Values are in IRE. |
| 134 | --- | --- |
| 135 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**) |

**Menus 136-139: Comp Y low clip and knee (NTSC, IRE)**



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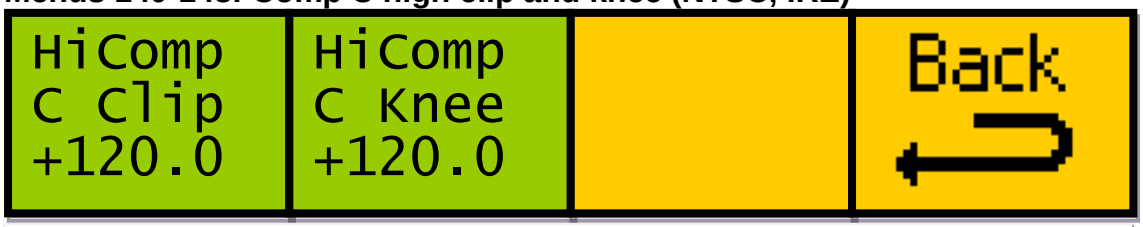
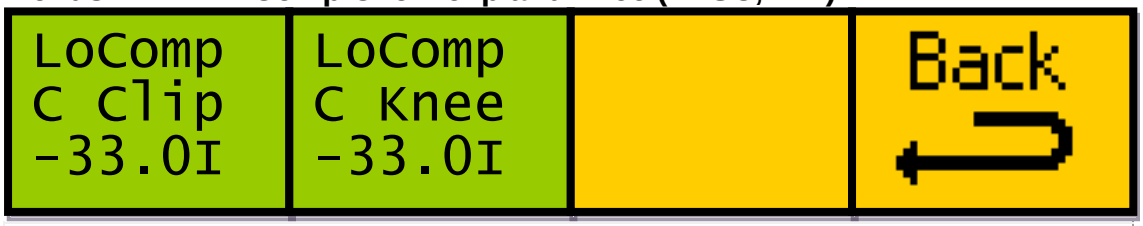
| Menu Num. | Heading | Function |
|---|---|---|
| 136 | Comp Y low clip | This menu adjusts the low Comp luma clip value. Values are in IRE. |
| 137 | Comp Y low knee | This menu adjusts the low Comp luma clip knee value. Values are in IRE. |
| 138 | --- | --- |
| 139 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 76-79**) |

**Menus 140-143: Comp C high clip and knee (NTSC, IRE)**




| Menu Num. | Heading | Function |
|---|---|---|
| 140 | Comp C high clip | This menu adjusts the high Comp component clip value. Values are in IRE. |
| 141 | Comp C high knee | This menu adjusts the high Comp component clip knee value. Values are in IRE. |
| 142 | --- | --- |
| 143 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 88-91**) |

**Menus 144-147: Comp C low clip and knee (NTSC, IRE)**




| Menu Num. | Heading | Function |
|---|---|---|
| 144 | Comp C low clip | This menu adjusts the low Comp component clip value. Values are in IRE. |
| 145 | Comp C low knee | This menu adjusts the low Comp component clip knee value. Values are in IRE. |
| 146 | --- | --- |
| 147 | Back | Pressing the button takes you to the |



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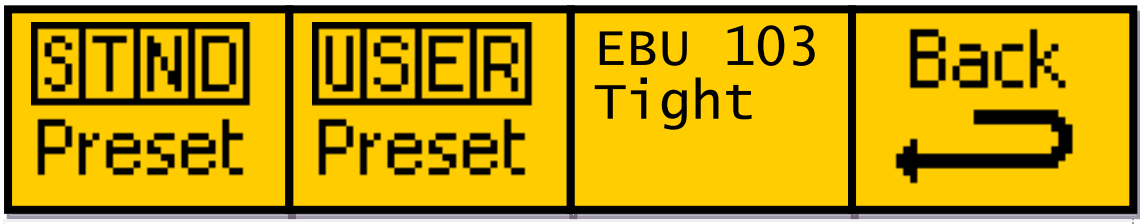
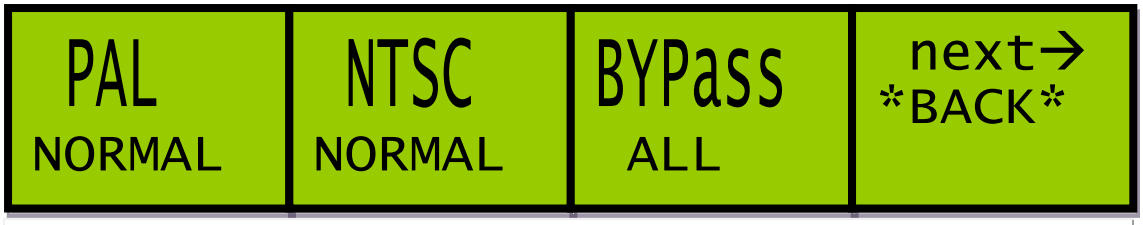
| | | |
|---|---|---|
| | | previous level of menus (Go To **Menus 88-91**) |

**Menus 148-151: Memories menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 148 | Preset memories | Pressing the button takes you to the preset memory loading menus (Go To **Menus 152-155**) |
| 149 | User memories | Pressing the button takes you to the user memory load and save menus (Go To **Menus 160-163**) |
| 150 | Current Preset | This shows the current Preset setting |
| 151 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 00-03**) |

**Menus 152-155: Preset memories menu 1/2**




| Menu Num. | Heading | Function |
|---|---|---|
| 152 | Load preset 1 | Pressing this button loads the 'PAL normal' preset memory.<br><br>For details on the preset memories, see section **3.3.5** |
| 153 | Load preset 2 | Pressing this button loads the 'NTSC normal' preset memory. |
| 154 | Load preset 3 | Pressing this button loads the 'Bypass all' preset memory. |
| 155 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)<br><br>Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 156-159**) |



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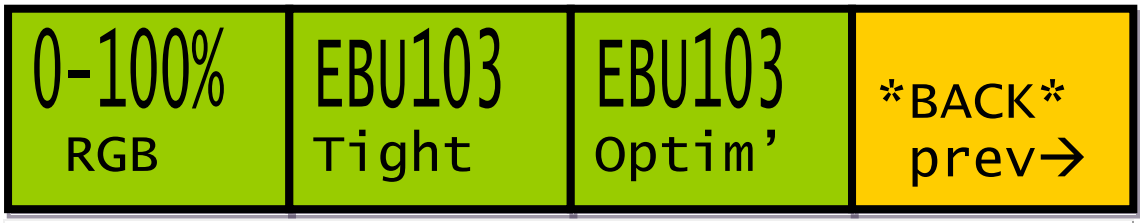
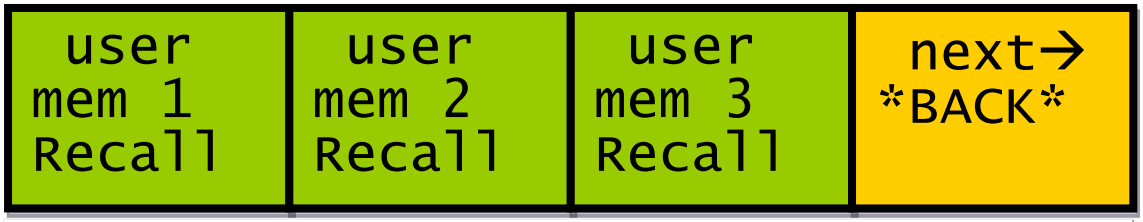
**Menus 156-159: Preset memories menu 2/2**




| Menu Num. | Heading | Function |
|---|---|---|
| 156 | Load preset 4 | Pressing this button loads the 'PAL normal' preset memory.<br><br>For details on the preset memories, see section **3.3.5** |
| 157 | Load preset 5 | Pressing this button loads the 'PAL normal' preset memory. |
| 158 | Load preset 6 | Pressing this button loads the 'PAL normal' preset memory. |
| 159 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)<br><br>Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 152-155**) |

**Menus 160-163: User memories menu 1/4**




| Menu Num. | Heading | Function |
|---|---|---|
| 160 | Load user memory 1 | Pressing this button loads the first user memory.<br><br>For details on the user memories, see section **3.3.6** |
| 161 | Load user memory 2 | Pressing this button loads the second user memory. |
| 162 | Load user memory 3 | Pressing this button loads the third user memory. |
| 163 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**) |



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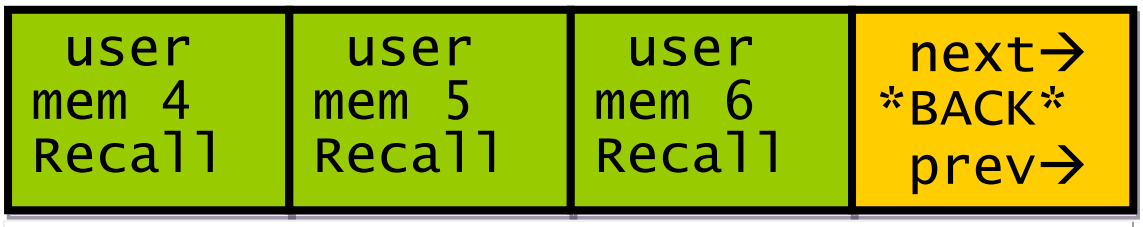
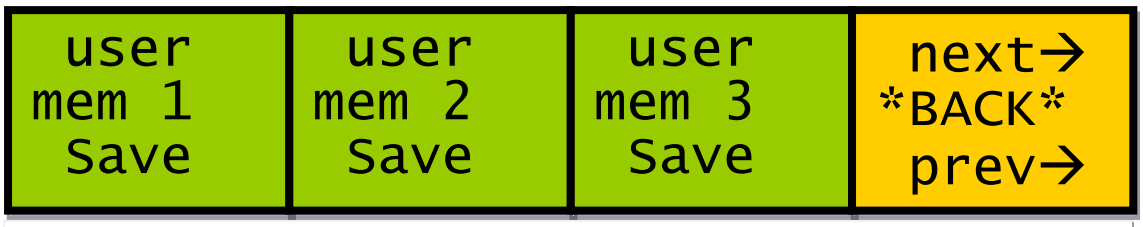
| | | |
|---|---|---|
| | | Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 164-167**) |

**Menus 164-167: User memories menu 2/4**




| Menu Num. | Heading | Function |
|---|---|---|
| 164 | Load user memory 4 | Pressing this button loads the fourth user memory.<br><br>For details on the user memories, see section **3.3.6** |
| 165 | Load user memory 5 | Pressing this button loads the fifth user memory. |
| 166 | Load user memory 6 | Pressing this button loads the sixth user memory. |
| 167 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)<br><br>Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 168-171**)<br><br>Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 160-163**) |

**Menus 168-171: User memories menu 3/4**




| Menu Num. | Heading | Function |
|---|---|---|
| 168 | Save user memory 1 | Pressing this button saves the current unit settings to user memory 1. |



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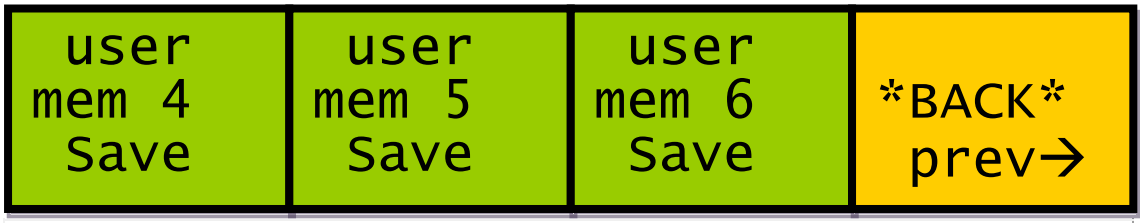
| | | |
|---|---|---|
| | | For details on the user memories, see section **3.3.6** |
| 169 | Save user memory 2 | Pressing this button saves the current unit settings to user memory 2. |
| 170 | Save user memory 3 | Pressing this button saves the current unit settings to user memory 3. |
| 171 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)<br><br>Pressing the next button on the panel will take you to the next menu in the nested menu sequence (Go To **Menus 172-175**)<br><br>Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 164-167**) |

**Menus 172-175: User memories menu 4/4**




| Menu Num. | Heading | Function |
|---|---|---|
| 172 | Save user memory 4 | Pressing this button saves the current unit settings to user memory 4.<br><br>For details on the user memories, see section **3.3.6** |
| 173 | Save user memory 5 | Pressing this button saves the current unit settings to user memory 5. |
| 174 | Save user memory 6 | Pressing this button saves the current unit settings to user memory 6. |
| 175 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 148-151**)<br><br>Pressing the prev button on the panel |



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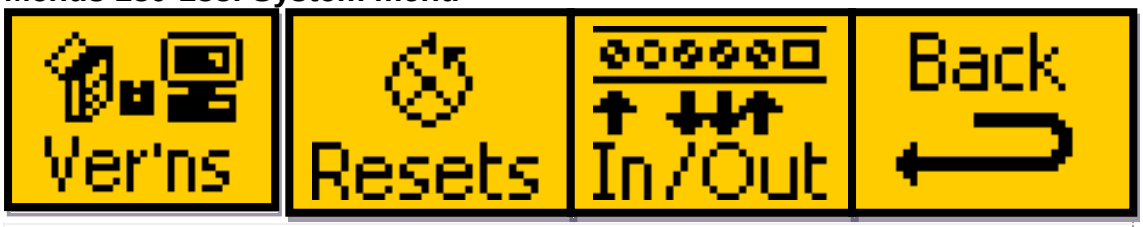
| | | |
|---|---|---|
| | | will take you to the previous menu in the nested menu sequence (Go To **Menus 168-171**) |

**Menus 176-179: KARMAudioRT Limits menu – this menu is only operational with the KARMAudioRT option (-K)**


| Menu Num. | Heading | Function |
|---|---|---|
| 176 | Loudness Menus | Pressing the button takes you to the Loudness processing menus (Go To **Menus 220-223**) |
| 177 | Attack/Window Menus | Pressing the button takes you to the Attack/Window menus (Go To **Menus 248-251**) |
| 178 | Peak Menus | Pressing the button takes you to the Peak processing menus (Go To **Menus 240-243**) |
| 179 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 12-15**)<br><br>Pressing the prev button on the panel will take you to the previous menu in the nested menu sequence (Go To **Menus 0-3**) |

**Menus 180-183: System menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 180 | Versions menu | Pressing the button takes you to the versions menu, which includes the software upgrade menu (Go To **Menus 184-187**) |
| 181 | Resets menu | Pressing the button takes you to the unit resets menu (Go To **Menus 188-191**) |
| 182 | Input & output video | Pressing this button takes you to the |



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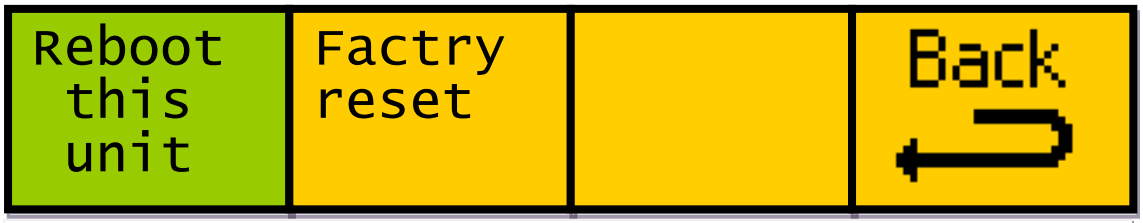
| | | |
|---|---|---|
| | settings | input and output settings menu (Go To Menus 224-227) |
| 183 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 08-11**) |

**Menus 184-187: Software menu**


| Menu Num. | Heading | Function |
|---|---|---|
| 184 | **LE-3G** version number | This menu displays the version number of the **LE-3G** |
| 185 | --- | --- |
| 186 | Upgrade software menu | Pressing the button takes you to the upgrade software menu (Go To **Menus 192-195**) |
| 187 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 180-183**) |

**Menus 188-191: Resets menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 188 | Reboot unit | Pressing this will reset the **LE-3G**.<br><br>The unit should finish rebooting within 30 seconds or so, and it should have the same settings loaded as it had before the reset button was pressed. |
| 189 | Factory reset | Pressing the button takes you to the factory reset menu (Go To **Menus 196-199**) |
| 190 | --- | --- |
| 191 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 180-183**) |



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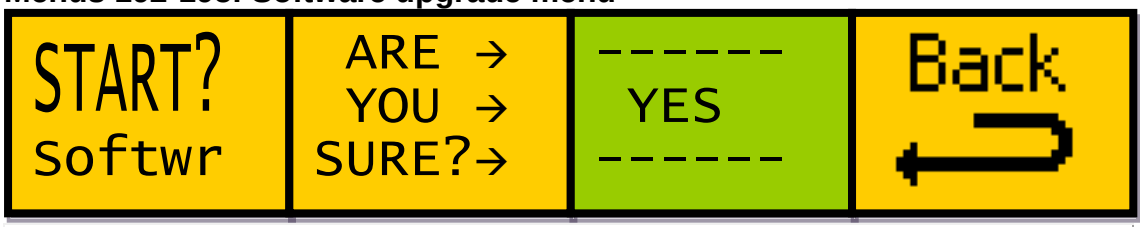
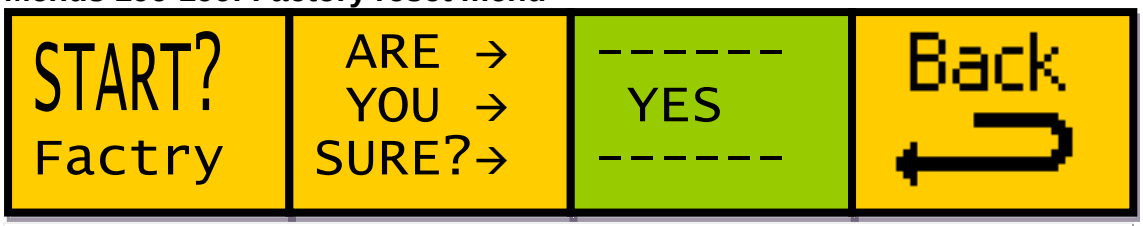
**Menus 192-195: Software upgrade menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 192 | --- | --- |
| 193 | --- | --- |
| 194 | Software upgrage confirmation | Pressing this button will confirm you want to update the software of the **LE-3G**, and will jump to the message displayed on **Menus 200-203**.<br><br>The details of the update procedure can be found in section **3.7** |
| 195 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 184-187**) |

**Menus 196-199: Factory reset menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 196 | --- | --- |
| 197 | --- | --- |
| 198 | Factory Reset confirmation | Pressing this button will confirm you want to perform reset the **LE-3G** to its factory settings. The menu icon will change to 'please wait' while the action is performed.<br><br>**WARNING!** Performing a factory reset will permanently erase all user memories that have been stored, as well as erasing the current power-on state. |
| 199 | Back | Pressing the button takes you to the previous level of menus (Go To Menus 188-191) |



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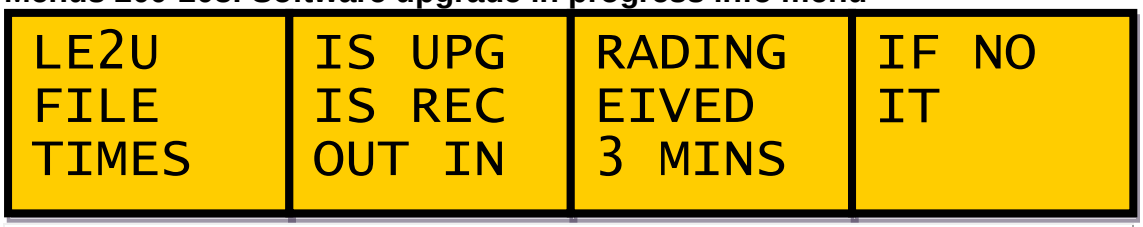
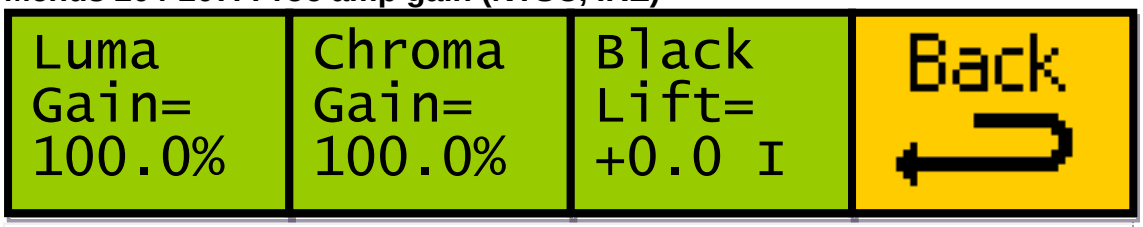
**Menus 200-203: Software upgrade in progress info menu**



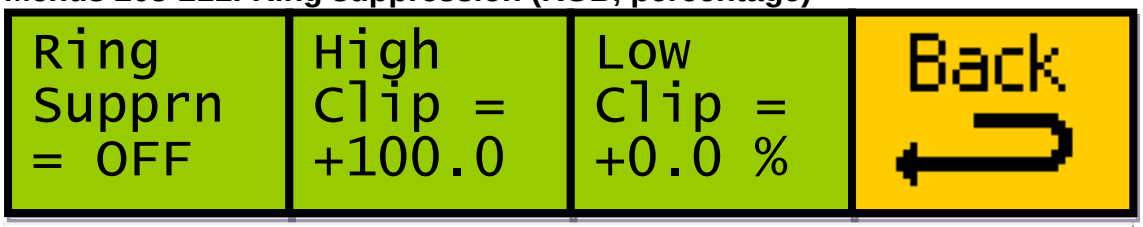

| Menu Num. | Heading | Function |
|---|---|---|
| 200 | --- | --- |
| 201 | --- | --- |
| 202 | --- | --- |
| 203 | --- | --- |

**Menus 204-207: Proc amp gain (NTSC, IRE)**




| Menu Num. | Heading | Function |
|---|---|---|
| 204 | Luma gain adjustment | This menu adjusts the luma gain between 0% and 200%. |
| 205 | Chroma gain adjustment | This menu adjusts the chroma gain between 0% and 200%. |
| 206 | Black lift | This menu adjusts the black lift between -30.0 IRE and +30.0 IRE. |
| 207 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 16-19**) |

**Menus 208-211: Ring suppression (RGB, percentage)**




| Menu Num. | Heading | Function |
|---|---|---|
| 208 | Ring suppression status | This menu cycles the Ring suppression between off, on and auto.<br>Will display 'DISABL' when legaliser mode is in RGB only or YCC as ring suppression isn't supported in these modes. |



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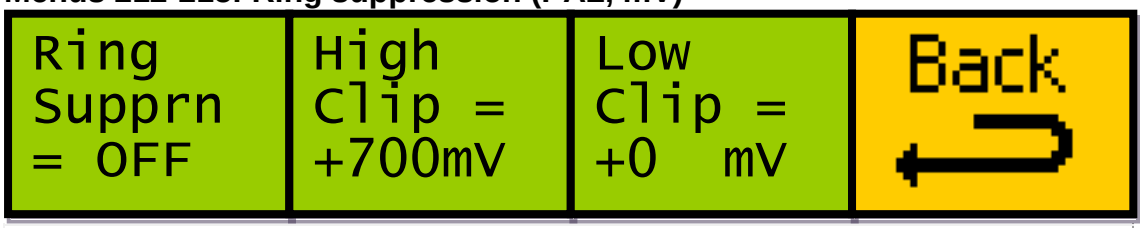
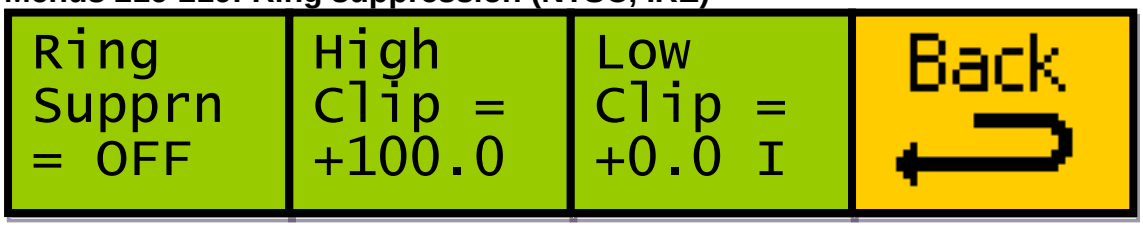
| | | |
|---|---|---|
| | | For more information on the ring suppression, Go To **3.3.1** |
| 209 | Ring suppression high clip | This menu sets the value for the high clip limit of the ring suppression. Values are in percent. |
| 210 | Ring suppression low clip | This menu sets the value for the low clip limit of the ring suppression. Values are in percent. |
| 211 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**) |

**Menus 212-215: Ring suppression (PAL, mV)**




| Menu Num. | Heading | Function |
|---|---|---|
| 212 | Ring suppression status | This menu cycles the Ring suppression between off, on and auto.<br>Will display 'DISABL' when legaliser mode is in RGB only or YCC as ring suppression isn't supported in these modes.<br><br>For more information on the ring suppression, Go To **3.3.1** |
| 213 | Ring suppression high clip | This menu sets the value for the high clip limit of the ring suppression. Values are in mV. |
| 214 | Ring suppression low clip | This menu sets the value for the low clip limit of the ring suppression. Values are in mV. |
| 215 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**) |

**Menus 216-219: Ring suppression (NTSC, IRE)**



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| Menu Num. | Heading | Function |
|---|---|---|
| 216 | Ring suppression status | This menu cycles the Ring suppression between off, on and auto.<br>Will display 'DISABL' when legaliser mode is in RGB only or YCC as ring suppression isn't supported in these modes.<br><br>For more information on the ring suppression, Go To **3.3.1** |
| 217 | Ring suppression high clip | This menu sets the value for the high clip limit of the ring suppression. Values are in IRE. |
| 218 | Ring suppression low clip | This menu sets the value for the low clip limit of the ring suppression. Values are in IRE. |
| 219 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 100-103**) |

**Menus 220-223: Loudness Levels menu**


| Menu Num. | Heading | Function |
|---|---|---|
| 220 | Karma Audio loudness limit | Audio Loudness limit that audio is corrected to as per ITU-BS 1770 specification |
| 221 | Gain allowable by Karma audio | The level of gain that Karma audio can apply to a low program audio level to maintain it at limit set in menu 220. This is a custom adjustment and to maintain all known loudness specifications **this must be left set to 0**. |
| 221 | Gain Threshold | This is the audio loudness level (gate) in LUFS/LKFS of audio below which will stop the gain changing when gain is not set 0. |
| 223 | Reset Karma audio integrated measurement | Resets the Karma integrated measurement back to zero time |
| 223 | Back | Pressing the button takes you to the |



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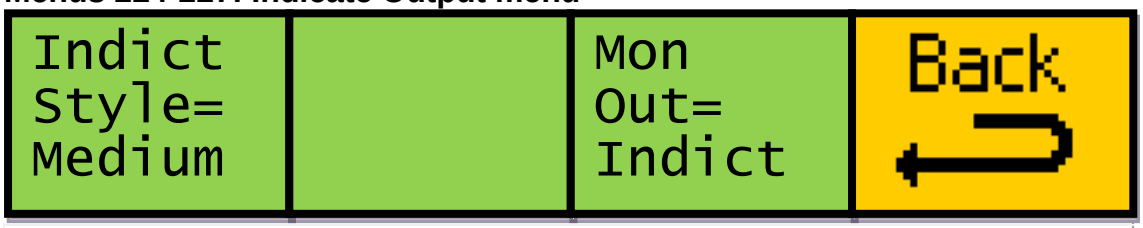
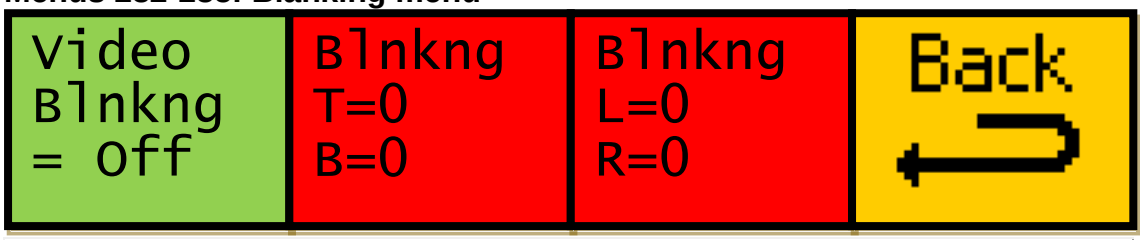
| | | |
|---|---|---|
| | | previous level of menus (Go To Menus 176-179) |

**Menus 224-227: Indicate Output menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 116 | Indicate Style | Level of indication of illegal pixel on monitor output. Light/Medium/Severe |
| 117 | | |
| 118 | Monitor Output | Sets monitoring SDI output to Indicate /Legal output/Raw unlegalised output |
| 119 | Back | Pressing the button takes you to the previous level of menus (Go To Menus 180-183) |

**Menus 232-235: Blanking menu**




| Menu Num. | Heading | Function |
|---|---|---|
| 232 | Blanking status | This menu the video blanking to On or Off. See section 3.3.2 for more information. |
| 233 | Top | This menu sets the number of lines that are blanked from the top of the picture. See section 3.3.2 for more information. |
| 233 | Bottom | This menu sets the number of lines that are blanked from the top of the picture. See section 3.3.2 for more information. |
| 234 | Left | This menu sets the number of pixels that are blanked from the left of the picture. See section 3.3.2 for more information. |
| 234 | Right | This menu sets the number of pixels that are blanked from the right of the |



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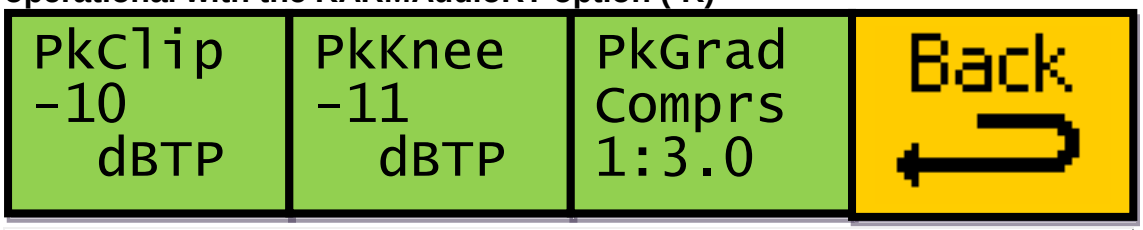
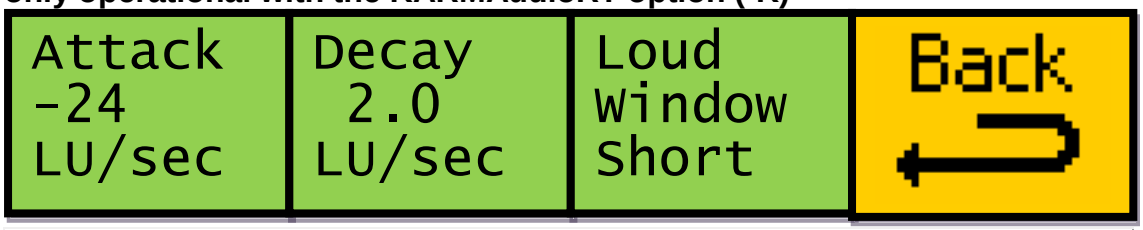
| | | |
|---|---|---|
| | | picture. See section 3.3.2 for more information. |
| 235 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 120-123**). |

**Menus 240-243: KARMAudioRT Peak processing menu – this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 240 | Peak Clip | This menu sets the level at which the audio peaks are clipped at in dBTP |
| 241 | Peak Knee | This menu sets the level at which the audio peaks start to be adjusted as per the gradient in menu 242 in dBTP |
| 242 | Peak Compression | This menu sets the ratio of the slope at which the peak is reduced by after the knee level has been reached in dBTP. |
| 243 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 176-179**) |

**Menus 248-251: KARMAudioRT Loudness processing menu – this menu is only operational with the KARMAudioRT option (-K)**




| Menu Num. | Heading | Function |
|---|---|---|
| 248 | Attack Rate | This adjusts the attack rate of the loudness correction in loudness units per second |
| 249 | Decay Rate | This adjusts the decay rate of the loudness correction in loudness units per second |
| 250 | Loudness Window | This is the duration of the averaging window used to determine the Loudness of the source audio. The 3 options are : |



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| | | |
|---|---|---|
| | | Short – a travelling window of 400mS<br>Medium – a travelling window of 3S<br>Intega – Integrated louness reset by pressing **menu 224** |
| 251 | Back | Pressing the button takes you to the previous level of menus (Go To **Menus 176-179**) |



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# 5 Technical Appendix

## 5.1 GPI/Tally/RS232 technical information.

The Processor card has an RJ-45 connector with GPI, Tally and RS232 connections as shown below:

| | | |
|---|---|---|
| 1 | GPI 1 | White/Orange |
| 2 | Not Used | Orange |
| 3 | GPI 2 | White/Green |
| 4 | GND | Blue |
| 5 | RS232 TX | White/Blue |
| 6 | RS232 RX | Green |
| 7 | LTC- | White/Brown |
| 8 | LTC+ | Brown |

**Table 1: GPI/LTC and RS232 pin-out on RJ-45.**

### 5.1.1 RS232 Interface.

This loosely follows the pin convention of EIA-561 which is a standard for RS232 on an RJ45 cable. Only TX, RX and Signal ground (pin 4) are implemented. For the **LE-3G** the following RS232 parameters apply:

- 115Kbaud
- 8 Bits, no parity
- 1 Stop bit.

### 5.1.2 LTC (Linear Time code) Interface.

This unit takes in standard balanced LTC at -10dB to +10dB level. The user can ground the LTC- side for unbalanced use, just using ground and the LTC+. This interface is only designed for LTC at unity play speed and will not track fast shuttling timecode.

## 5.2 On-Board automation protocol

### 5.2.1 Implimentation on RS232

A simple text based protocol has been implemented on the RS232 interface. All text strings are shown in inverted commas; do not include them in the actual command sent. Each byte within a text string must be sent within 10mS of each other or the command will time out. This on-board protocol is not the same as the **geNETics** protocol. Refer to the **geNETics** protocol in section 6 (Product



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Automation) of the etherbox manual. **GeNETics** protocol is used to control a number of processor cards using one connection.

PLEASE NOTE – These commands are only active if the LOGGING mode is set to OFF (see Section **Error! Reference source not found.**). If a user preset is recalled that sets LOGGING back to ON these commands will become inactive again.

The command set is as follows:

| Command | Meaning | Example hex string |
|---|---|---|
| "Mnn" | (M)emory, nn is the memory/preset number | 4D,30,31<br>Select Memory 01, which is the PAL preset. The number represents the following:<br>M01= PAL preset<br>M02= NTSC preset<br>M03= Bypass all Processing<br>M04= 0-100% RGB<br>M05= EBU103 tight preset<br>M06= EBU103 optimum preset<br>M07→M12=User Presets 1→6. Initial preset number depends on line standard. (See User Memories 3.3.6) |

A response will occur within 100mS of the command. The responses are as follows:

| Response | Meaning | Hex string |
|---|---|---|
| "OK" | Command was understood and will implement. | 4F,4B |
| "E0" | Command timed out. | 45,30 |
| "E1" | Error 1. Unknown command. | 45,31 |
| "E2" | Error 2. Memory number is not in range. | 45,32 |

# 5.3 Technical Specification

## 5.3.1 Description

Provides legalisation of the SD (Standard Definition version), SD/HD (Multi-rate version) or 3G (Level A, 1080 50/60p) input signal with full 10 bit processing throughout.

## 5.3.2 Features

- Composite, YUV and RGB colour spaces and combined RGB+composite with two independent outputs for "Legalise" and user controllable "Legal/Indicate".
- Adjustable clipping levels and soft clipping knee levels.
- Integral luma and chroma gain, black level adjustment & hue rotation.



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- EBU-R 2003 standard SDI legalisation settings and 7.5 IRE or 0 IRE Pedestal with 6 user memories and common presets.
- Log output with timecode and PC viewer programme. Automation Port using simple protocol for presets/memories
- Unique severity display mode on monitoring output.
- Firmware and software fully updatable by file upload*
- Mechanical relay bypass option available.
- Optional web based java soft panel and specific "web app" available.*

*Not available on the MX-9 chassis

### 5.3.3 Formats

- **Standard Definition version** - 625/50, 525/59.94
- **Multi-rate version** - 625/50, 525/59.94, 1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i, 720p/23.98/24/25/29.97/30/50/59.84/60
- **3G Version**

625/50, 525/59.94,
1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i,
720p/23.98/24/25/29.97/30/50/59.84/60
*Dual-Link* 4:4:4 -
1080i/23.98psf/24psf/23.98p/24p/25p/50i/29.97p/30p/59.94i/60i,
720p/23.98/24/25/29.97/30/50/59.84/6
1080p 50/60/59.84 Level A.


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